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How State Criminal Systems Fit Into National Net

By Joseph Hanlon
Special to Computerworld
(Third in a series)

ALBANY, N.Y. The Appalachian meeting in November 1957 was a conclave of over 100 of the top brass of organized crime. Two years after the meeting, state officials still had not assembled all of the data already in police files about the participants; one man's records were divided among 200 separate files.

The obvious answer was to computerize all available data, and Nysis (New York State Identification and Intelligence System) was born. In 1969, New York became the first state to computerize criminal histories.

The FBI's National Criminal History System (NCHS) is built on a foundation of such state criminal history computer data banks. Nysis was the first and is the largest state system.

Spotlight Report

Using a Burroughs 8650N, Nysis has stored the criminal histories of 500,000 people. Under a new criminal procedure law that went into effect Sept. 1, everyone arrested for a felony or misdemeanor under

the penal law (as distinct from motor vehicle, conservation, and other laws) must be fingerprinted and added to Nysis.

It is expected that the rate of increase, now roughly 50,000 names per year, will jump to 150,000 annually.

The criminal histories, commonly called "rap sheets," contain:

- Physical description
- Numerical code for fingerprints
- All arrests, including date, time, and place of alleged crime and names of persons arrested at the same time
- Dispositions

(Continued on Page 2)

DEC Expands Upward Medium-Scale Users Get 5 New Alternatives

By Michael Merritt
Of the CW Staff

NEW YORK Digital Equipment Corp. has become a full fledged mainframe supplier for users to consider in evaluating acquisition of 370/135 through 370/155 size machines. DEC last week expanded its Decsystem-10 line of computers by adding a Decsystem-1040 (370/135 range), a 1050 (370/145 range), a 1070 (370/155 range), and two dual processor intermediates, the 1055 and the 1077.

The new systems include a complete line of software, double-density disks, communication equipment and built-in double precision floating-point hardware. The 1070 and 1077 also have virtual memory capability, according to DEC.

The machines are applications software compatible with DEC's earlier PDP-10.

The 1040 is basically the old PDP-10 CPU with a new operating system.

The 1050 adds a high-speed drum for file swapping. The 1070 is based on an entirely new CPU.

Decsystem-10 memory differs from the PDP-10 memory in extra addressing capabilities and buffers to facilitate higher throughput, DEC said.

All five computers are capable of operating in time-sharing, real-time, and batch modes simultaneously. Memory is available in 16K-word modules, and costs \$50,000 per module. The system uses 36-bit words, Ascii internal coding, and 6- or 7-byte words.

The 1040, which comes with 32K to 256K words of core memory, offers about three times the internal speed of the IBM 370/135. Price for the 1040 CPU is \$180,000.

The 1050, which has approximately the internal speed of the 1040, comes with 64K to 256K words. In addition, a typical 1050 includes 120 million characters of disk storage. From 8 to



The new Decsystem-10 family can meet any medium-scale computer user's needs, starting with the 1040, above, at the low end and running up to the 1070, below, which also comes in a dual-processor version, the 1077.



32 communications lines, two industry-compatible tape units, a 1,000 line/min line printer, and a 1,000 card/min card reader. The 1050 CPU sells for \$263,000.

The 1055 is the dual processor

version of the 1050, and normally uses the same peripheral equipment. It offers double the computing power for 20% extra cost, according to DEC. Minimum memory size for the 1055 is 80K words. CPU price is \$443,000.

The two largest computers in the line, the 1070 and 1077, use a central processor with internal speeds half that of the IBM 370/155.

The 1070 includes an address paging system for a virtual memory capability up to 4 million words and is capable of servicing 127 simultaneous users, DEC said.

Minimum memory size is 98K while maximum is 256K. A typical system would include 240 million characters of disk storage, two high-speed swapping drums, four or more high-speed magnetic tape units, a 1,200 card/min reader and a 1,000 line/min line printer. The 1070 CPU sells for \$513,000.

The 1077 is a dual processor version of the 1070. The minimum core memory is 131K. It uses the same peripheral devices

as the 1070 and the CPU costs \$853,000.

Upgradeable

One feature of the new line of computers is that when a user wants to upgrade he need only replace the central processor. The core memory units are family compatible. The system is also software and peripheral-compatible throughout the line. The machines are designed for

(Continued on Page 2)

Never Had Credit Card

Man Dunned for Wrong Account

By Joseph Hanlon
Of the CW Staff

UNIVERSITY PARK, Pa. — Charles J. Johnson never had a Shell Oil Co. credit card, but the Shell computer has been sending him bills and dunning letters for the past year.

Shell officials have been uncooperative with Johnson and only slightly helpful in the past. A CW investigation indicates the problem apparently arose from sloppy procedures in the Shell computer center.

According to a Shell spokesman, Johnson was one of many college students to be sent an unsolicited credit card last year.

But Johnson said he never received the card.

Unfortunately, sometime after the mailing, several thousand of the names and addresses became separated from the credit card numbers.

There was nothing to do, the official said, but wait until purchases were made on the cards (which have no address on them) and try to relate the address of the gas station to that of a nearby credit card recipient.

Once that connection was made, the data was entered into the computer for future billing. In this case, when a Maryland woman named Johnson began

using her card, the number was incorrectly associated with Charles Johnson's name and address, and the bills were sent directly to him.

Tapes Over Holes

When the first bill came, Johnson put tape over the holes in the card and sent it back with a note. More bills came and Johnson wrote three letters to the credit department. None was answered, he said.

Finally, he wrote to company executives listed in Moody's, and the credit office called to tell him everything was all right.

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Has Sent Memory

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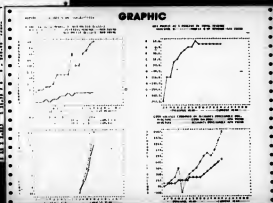
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Pollution Fight Not Only Benefit Of USC's Computer Data Bank

LOS ANGELES—They started with just a few key words and phrases such as "olfactory perception," "carbon dioxide concentrations," "effluents."

A short time later, more than 740 pages of scientific data on smog to help the federal government set anti-pollution standards had been collected.

The process was typical of recent computerized data searches by the Western Research Applications Center (Wesac) at the University of Southern California. Wesac, operated by USC under a contract with Nasa, specializes in making available to business and industry the billions of dollars worth of technological information developed in recent years by Nasa in its successful moon quest, as well as from other sources.

Although Wesac is not specifically in the business of fighting environmental

pollution, many of its recent operations have touched on the problem significantly, according to A. Kendall Oulie, Wesac director.

Problems recently helped by Wesac include:

- A San Fernando Valley engineering firm obtained information that enables it to design natural gas conversion kits for automobiles. The new device cuts automobile emissions by 90% and will be a further aid to the federal government in setting anti-smog standards.

- A Wesac search unearthed a Japanese document describing a laboratory-proven process for removal of mercury compounds by utilization of a bacteria which breaks the chain in mercurial salts.

- With a bank of easily accessible reports numbering almost a million, covering about 15,000 subjects, however, the possibilities are vast."



Dr. Gwilym Lodwick, professor and chairman of the University of Missouri Medical Center radiology department "talks through" an X-ray Diagnosis.

X-Ray, CRT Display Strong Tools

COLUMBIA, Mo. — A computer system at the University of Missouri Medical Center is slashing critical hours and days from the time needed to get X-ray diagnosis to physicians and nurses.

Mars (Missouri Automated Radiology System) eliminates the need to dictate, edit, type, proofread, distribute and file X-ray diagnoses by hand. It permits radiologists to enter diagnostic information directly into an IBM 360/50 from CRT terminals in the radiology department.

Dr. Gwilym Lodwick, professor and chairman of the radiology department at the 440-bed institution said: "We always had emergency conditions in which we gave a doctor our diagnosis verbally, shortcutting the manual typing system. Now we give every doctor every diagnosis just that fast, regardless of case load."

He said accuracy, uniformity and speed make Mars especially useful in the large medical center.

"No matter how erudite a radiologist's opinion is," Dr. Lodwick said, "it is of little importance if it is available after clinical decisions already have been made."

Sitting at one of nine IBM 2260 terminals, a radiologist is "talked through" his X-ray examination by the computer.

It displays a series of fill-in-the-blank formats. The radiologist indicates the location and nature of his findings, adding whatever free-text comments he thinks appropriate. The computer then displays his findings and notations. He proofreads the display, making whatever changes are necessary, and releases the final report.

The computer stores this final report in its electronic files. Simultaneously, it prints a copy of the report at output terminals located on the patient's ward and in the radiology department.

In the evening, the day's collection of reports are stored permanently in a large disk file. Any patient's record can then be retrieved in a matter of seconds for review.

"As a research and teaching tool," Dr. Lodwick said, "Mars provides investigators with fast, efficient access to all of a given sort of case."

"As an administrative tool, Mars has solved the dual problems of inaccuracy and inadequacy of a dictation-typing-pool system."

"And, as a diagnostic tool, Mars combines the radiologist's professional expertise with a series of computer programs which insure a full opinion is prepared and that all variables are considered."

DP to Monitor Containers

WASHINGTON, D.C. — Computer Identics Corp., Westwood, Mass., and Transocean Gateway Corp., New York City, have developed a system for the Maritime Administration that employs computerized controls to monitor and record container movements at port terminals and staging areas.

The system is expected to provide up-to-the-minute, accurate container inventory and also help prevent thefts as well as costly time-consuming misrouting.

Don't miss:

Walter Heller
Glenn Seaborg
Stephen H. Fuller
S.I. Hayakawa
Ted Sorensen

Russell McFall
Samuel Bonsack
W.C. McGowan
Seymour Joffe
Martin Karp

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Let's consider the *real* cost. The cost in time is obvious. 3270 deliveries are announced for the 2nd quarter of next year. Courier is delivering *now*.

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Tax Credit Problems?

WASHINGTON, D.C. — Businessmen using the Internal Revenue Service's new "simplified" procedures for determining tax credits for depreciation on their computers can get help from a new office within IRS.

The tax agency has established the Office of Industrial Economics (OIE) to update guidelines on equipment lives and repair allowances under the Asset Depreciation Range (ADR) system.

The continual updating will be based on "current industrial data" compiled for the first time, IRS said, on the actual use of property subject to depreciation, which includes computers and other equipment and machinery.

The ADR system is an elective procedure for determining depreciation allowances for particular classes of assets acquired after Dec. 31, 1970. New regulations require businesses to keep more detailed records, and report more regularly on equipment written off for tax deductions, IRS noted.

These reports will be used to indicate actual practices followed by business in the retirement and replacement of equipment, and will serve as the basis for subsequent revisions of depreciation rules, IRS added.

The new office is in Room 3244 of the IRS building here.

But Programmers Have It Easy

Analysts a Problem in Hong Kong

By Bohdan O. Szaprawick

Special to Computerworld

HONG KONG — "If salaries for senior systems analysts in Hong Kong go any higher," says Robert Tih, the president of the Hong Kong Computer Society, "it may be cheaper to import systems analysts from the UK or Australia signing them up for two year contracts at a time."

The problem arose over the last five years when Hong Kong's computer installations soared from only six in 1966 to better than 60 systems today. At the same time the island colony is more than adequately supplied with programming talent and may even have an oversupply of programmers due to a proliferation of EDP schools teaching key-punching and programming.

It appears Chinese are particularly suitable to become programmers because of the nature and training of the people here. At an early age Chinese children must begin to memorize Chinese characters to be able to read and write properly. There

are several thousand of these and the youngsters develop a knack for memorizing symbols and characters which carries over into programming.

But when it comes to systems analysis the Chinese programmer has difficulty becoming an outstanding analyst, and many programmers have been promoted to function as analysts with only the least of qualifications.

What particularly irks management of computer installations is that they demand and so far get, outrageously high salaries not reflective of their actual value to their organizations.

This problem was recently raised in an issue of GI-GO the monthly newsletter of the Hong Kong Computer Society. Various industry spokesmen are demanding that stability be brought into the data processing community.

Actually there are about 64 computers here ranging from small NCR 500s all the way to IBM 360/40s, Univac 418s and an ICL 1904A operated in a time-sharing mode between two universities.

The Hong Kong and Shanghai Bank claims to have one of the most advanced on-line systems in the world. Almost 50% of all the computing power is concentrated in the Hong Kong banking industry.

This concentration of computing power supports about 1,000 data processing people who are paid from \$300 for programmers to \$800 monthly for senior systems analysts. Considering additional 10% bonuses common to the data processing community the analyst is well paid.

The Computer Society seriously is considering the introduction of standard examinations and tests based on London City and Guilds tests particularly for programmers. Due to an overproduction of programmers by sometimes questionable schools it is becoming quite difficult to judge their ability and the society hopes most computer users will agree on this method of maintaining quality operations.

Partly, the shortage of the systems analysts could be alleviated by an established software industry but this does not seem to be the case in Hong Kong. Questioned on this point several industry leaders agree that the Hong Kong user simply has not caught on to the use of outside help.

Patches Make Posting Less Error Prone At Assessor's Office

WEST PALM BEACH, Fla. — "Computerization mistakes" resulting in a \$40,000 piece of property being valued at \$92 million were really just one "posting error," according to the county tax assessor.

Palm Beach County Assessor David L. Reid said an improvement had been made to the program, which computes property valuations using the county's RCA Spectra 70/45, so that such unreasonable output does not occur.

The county official explained that there are different means for determining property value, either by square footage or by the "unit" itself. The old program called for entering frontage or square footage, then multiplying that figure by an amount in the tax formula.

The parcel in question should have been valued under the "unit" method, and therefore its value of \$40,000 should have been multiplied by "one," instead of by about 2,300.

Under the program improvement, a special coding will be used to identify "unit" parcels, and the computer will reject records when the input is "other-than-one" in that block determining the multiplier.

"It was simply a posting error. A human error. There was garbage for input," he added.



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Editorial

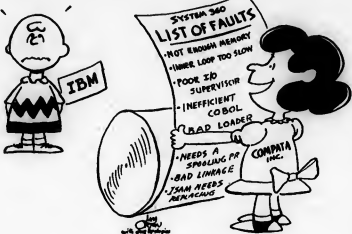
Too Significant

The Japanese plan to assign each of their citizens a number.

Under one proposal, 10-digit numbers would be used that, like our Social Security numbers, would have no significance other than being unique for each person.

But under a second proposal, 14-digit numbers would be used, including six digits for birth date and four digits for living area, presumably place of birth.

The second proposal unquestionably would represent an invasion of privacy if adopted. Every time a person was required to give his number, he would automatically be giving his age and place of birth. When such information is not pertinent to the situation, persons should not be put in the position of automatically supplying it.



'N Just Start Right from the Top'

Letters to the Editor

Corporate Relationship Responsibility of Many

I find a distinctly one-sided point of view expressed in Cowan's article "On-line Plotters Gain Favor Among Data Users" (July 21). I have had several years of experience with both analog and digital plotters, both on- and off-line to computers in local and remote locations. Cowan makes no mention of the two problems I have experienced with respect to remote plotting. It is possible that these problems are limited to the small engineering users with whom I am most familiar, but I doubt it.

• Line noise over telephone lines makes plotting at remote plotters connected to the CPU through low-speed terminals quite unreliable. Plots must frequently be rerun several times before a "glitch-free" plot can be obtained. While this is a technical problem for which the telephone companies must take primary responsibility, it nevertheless makes remote plotting from time-sharing companies rather impractical.

Perhaps the manufacturers of plotters and plotter-controllers could add the redundancy necessary to their hardware and software to overcome this problem.

• The cost of remote plotters (with controllers) runs in the range of one and a half to four times the cost of a Teletype terminal. Most small (time-sharing) users of remote computing are unable to justify this level of fixed overhead cost for the limited plotting needs it may have.

For the above reasons, I am tended to turn more and more toward off-line plotting. It would be a great service to small users of remote-computing services if plotter manufacturers would set up remote or off-line plotting centers in many cities around the country where reliable plots could be obtained on a usage charge basis.

I would be interested in any further comments on this topic by Cowan or any other reader.

Laurence N. Beckrock
Coordinator of Computer Usage
Woodward-Clyde & Assoc.
San Francisco, Calif.

Remote Plotting Problems Turn Reader to Off-Line

Thank you for the flattering interview (CW, Aug. 4).

There is, however, one point which

should be added. The excellent relationship between my company, Sanders Associates, Inc., and the customer, Avis Rent-A-Car System, Inc., is now and has been the result of efforts on the part of many people in both companies. I have been fortunate to be associated with this combined team of competent, hard working people.

John L. Gropper

Sanders Associates, Inc.
Nashua, N.H.

Let's Hear from Others

I would like to protest the appearance of letters from Alan Taylor in the Letters to the Editor column in the July 23 and Aug. 4 issues. This section of a publication traditionally has been a forum for the readership and not for contributors to the publication.

I am sure your audience would be tremendously more interested in the

views and reactions of other computer professionals, especially since the views of Taylor are no obvious.

Thomas H. Tom
Manager

Canadate Corp.
Madison, Wis.

Taylor, COP Work Loaded

I have followed with great interest the series of articles by Alan Taylor on the subjects of DPMA, hardware manufacture, and the professionalization of data processing in general.

I have also followed the readers' comments, some of which have been unfavorable to his articles on these subjects. Personally, I think the service he is performing is unquestionably good for all of us involved in data processing. It will bring pressure to bear on issues long since overlooked or just plain ignored by others not brave enough to tackle the

giants of the industry. And, obviously, there are many other areas of concern involving different manufacturers and providers of services. Given time, I feel certain Taylor will get around to those problems as well.

I want to commend Taylor for his excellent articles on the COP program and, especially, for his help in organizing a national group of COP holders called "The Society of Certified Data Processors."

I urge all COP holders to contact Taylor for details about the organization. I also want to commend CW for its willingness to provide a vehicle for getting something done about all these issues.

Donald R. Collins, DCP
DP Manager

KCL Corp.
Sheboygan, Ind.

Society of Computing

Communications Gap Divides Business, Academia

By Miles Benson
Special to Computerworld

Dick S. is probably the top operating systems man in computing today. He works for a software house in southern California and has designed, and headed implementation teams for, some of the most advanced and dependable operating systems that exist.

But he's never published anything. Dr. Nathan L. is an acknowledged expert on operating systems, at a leading East Coast university. He knows the literature on operating systems inside out. But Dick S. doesn't appear in the literature. And Dr. L. will probably never hear about him.

Prof. Tom P. is head of computer science at a Midwestern college known for its advanced, innovative program. He is editor of a computing technical journal and just finished conducting a computing conference on operating systems.

Dr. L. was there as a speaker. Dick S. was not.

Conference attendees went to learn about operating systems from America's foremost experts on the subject. Each was sufficiently versed in the field to be aware of the breadth and depth of the literature on the subject.

At the end of the conference, everyone agreed it was well conducted, an excellent learning experience. They were right, of

course.

And yet they were wrong. Because Dick S. wasn't there.

Whose fault was that? Dick S. for never taking the time to write for publication? His company, for shying away from publishing material on possibly proprietary techniques? Dr. L., for not going beyond the literature in seeking knowledge in his field of expertise? Prof. P., for not scouring the software houses for suitable speakers for his conference? The journal Prof. P. edits, for not trying harder to obtain publications from those actively working in the field? The conference sponsor, for not demanding that an effort be made to ensure the best possible speakers at his conference?

Computing has existed as a working field for about 20 years. Computer science has existed as an academic field for about 10, and in that short 10 years, incredible as it may seem, a gigantic communications gap has opened up between the practitioners such as Dick S. and the academic experts like Dr. L.

They are not aware of one another. Worse yet, even if they were aware of one another, there is some doubt whether they could communicate.

In the hocwork world of computing, an ad hoc vocabulary has grown up, and Dick S. can speak that language very well. In the academic world, the accumulation

of a body of interacting literature has defined another language in which Dr. L. is comfortable and conversant. But in many ways, though the languages describe the same subject matter, they are foreign to one another.

Poles Apart

In other academic areas, it is understood and unhappily accepted that the industrial and the academic worlds do not mix as well as they should. In computing, though, it still comes as a shock. In only 10 years the two groups have moved poles apart.

Computing is an innovative field. It is truly possible that innovative people will continue to let their world polarize like the older disciplines, without someone caring enough to stop it?

But who?

Dick S. has a deadline to meet. He'll start his paper, probably, but not until next month... or next year.

Dr. L. has all he can do keeping up with the literature. Why should he leave his ivy-covered halls to beat the bushes for silent talent?

Prof. P. could expand the scope of his next conference. But the group at the last one became quite close-knit, and why should he exclude someone to make room for an unknown?

Who, indeed?

Is 3330 the 2314's Immediate Successor?

Do You Need to More Than Double 2314 Capacity?

Recently I was talking to the manager of a fairly large installation. He was telling me why he has decided to go to the 370 from his 360/50. After a number of reasons had been discussed, he came out with the fact that, in any case, his firm had to go up because it needed the extra disk space over the 2314 currently being used.

"Our on-line banks are going up," he said, "and while we could perhaps get by by knocking some of the programmers' test areas off, that would only hold us for a short time."

His explanation had a ring of truth in it. Indeed, from a hardware point of view, and considering his location in a fairly remote part of the country, I am inclined to accept it as being valid. But — it did not seem very reasonable to me in general terms.

So, let us take a look at it. Is it a fact that when you have expanded the disk utilization over that safely handled on a 2314 you should economically now go to the IBM 3330?

Alternatives Available

What are the possible alternatives? Well, there are no hardware alternatives that are exactly equivalent to the 3330. A number were in development until a couple of months ago, but then with the arrival of the IBM fixed lease prices the manufacturers decided it just was not worthwhile putting anything on the market for the first couple of years of the 3330's life. So, if you are looking for a data bank on-line of 800 Mbytes there is no alternative.

But, from what I gather, people are not looking for 800 Mbytes. It would be startling if they were. What they are looking for is something very different; they are looking for an extension to the 2314 capacity.

The 2314 capacity is a mere 233 Mbytes. Really as far as pay-load operations are concerned you can leave off the system disk and reduce it down to 204 Mbytes.

And so the area involved most is the area from about 200 Mbytes to about 350 Mbytes, with perhaps expansion capabilities up to around 400 Mbytes. This is the important area for people who are merely continuing to expand their requirements, as opposed to those users opening up a new ambitious on-line system that maintains the position of every place of office equipment in the company or something equally space consuming.

And while there are not any competitors to the 3330 at 800 Mbytes, there certainly are alternatives at the

more used ranges of 250- to 500 Mbytes. In fact, there are currently four manufacturers, all with experience in the disk field, who are producing what are called "double density" disk drives.

These are all 2314-type drives with the recording, in one way or another, organized so that 116 Mbytes are stored on a single disk pack. This is double the quantity of 58 Mbytes stored on the standard IBM 2314 pack.

The manufacturers are California Computer Products, with its 215 drives and 1016 controller; Marshall Data Systems, with its M2900 drives and 3800 controller; Memorex, with its 3665 due out at the beginning of next year; and Information Storage Systems, whose 5625 drives and 5650 controllers are being marketed by Telex Corp. All of these can provide users with storage capacities above that of the 2314.

Different Methods Used

The way they do it differs from manufacturer to manufacturer. The Memorex system is designed for OS users, and is comparable for replacing data cells. Here Memorex will provide appropriate entries for the device characteristic table at the time of system generation. It also is using a different coding system for the actual recording.

ISS also is providing for the insertion of parameters into job rating system both in OS and DOS. It is doubling the number of tracks on the disk from 200 to 400, and the distance between the tracks is being halved.

Marshall is going a different route and sets it up as though each of its systems was two separate 2314s, without making any change even in the parameters of the operating system. CalComp also is using magnetic tracks and is setting it up in the software as though there were 16 spindles on a 2314.

Economically, therefore, the area of most interest the comparison is just what happens during the period between approximately 250 Mbytes and 500 Mbytes. Figure 1 diagramming the cost comparison for replacing the individual systems using double the 2314 density and the 3330 shows that, in fact, in this area the 3330 costs about \$700/mo more than its equivalent outside.

Payload Operation

Figure 2, however, deals with the same subject but from a slightly different angle. It assumes that one disk is going to be reserved for the systems disk, both on the original 2314 and on the new system.

What it does then is to compare the actual costs of the payload area, the area that is available for actual data. Here it can be seen that the savings by using double the 2314 are rather higher, averaging around \$800/mo, than they were shown to be on the purely

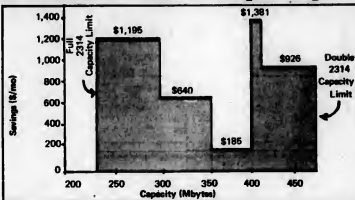


Figure 1. Possible savings where data on-line requirements are over one 2314 capacity, and under two times that capacity.

The figures show the savings available from the use of plug-in compatible disk units using double the original IBM 2314 density, in comparison with the IBM 3330 units. All prices used are based upon one-year lease figures.

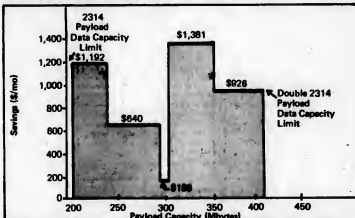


Figure 2. Adjusted savings where allowance is made for a dedicated systems disk, and where on-line data requirements fall between the capacity of one and two IBM 2314s.

The figures here show the payload data (not including the capacity of the spindle assumed to be dedicated for systems disk purposes) rather than the physical data loads used in Figure 1, and is more realistic to users' needs. Note the change in the incidence of higher charges in the 300- to 400 Mbyte area.

hardware operation. The huge size of the 3330 disk packs tells against them.

(In fact the size and incompatibility of the 3330 packs is actually another problem that users of the double density 2314s can avoid. And in view of the investment many users have made in 2314 packs it is quite a considerable financial point in its own right also.)

So, as far as I can see, the most economic way to get between 300- to 400 Mbytes is to leave IBM — which has apparently decided not to produce a doubling drive 2314 for its users — and instead to go outside. The difference will pay for one operator, or alternatively it

can be used to reduce that data processing budget.

And there is no need to think that this is being dilatory. IBM, for its own reasons, decided against providing double-density drives, and so created this economic gap. Computer efficiency isn't gained by using equipment that really is for a different situation.

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Computerworld's editors will examine the subject of microfilm as it relates to computers in our Computers and Microfilm Supplement coming in our September 29 issue.

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the subroutine to return to a calling program the character values associated with a date. When provided with the numeric value for September 1, 1971, the module will return either 'WEDNESDAY, SEPTEMBER 1, 1971' formatted for reports, etc., or 'WED WEDNESDAY SEP SEPTEMBER' in fixed fields, depending on a control code. It will process dates from 1901 to 1999. This module complies with all standard linkage conventions and is written in ALC for use on the System/360 (except Model 20) and the System/370. The module may be called from programs written in ALC, COBOL, or PL/I.

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Port to Port Paperwork

Shippers Need Computer Help

NEW YORK—Nothing sinks a cargo ship's effectiveness faster than waiting for documents to arrive at the destination port. One practical answer to the mire of shipping papers is the use of computer links between ports of exportation and destination, according to Cmdr. A.E. Wills of Marine Office-Applington & Cox Corp. (MOAC), marine insurance managers.

Wills explained the need for a faster, less cumbersome system. "To process some exports or imports be many as 80 separate documents may be needed to make the entire journey, 43 in this country alone.

A ship entering Buenos Aires harbor, for example, requires 39 documents; in Manila, 49; in San Francisco, 19. When you are dealing with that many papers, including letter of credit and insurance certificates, you can almost assume there will be some paperwork problems with each shipment.

"The ultimate step," Wills stated, "is for computers at each port to be linked in direct communication. A computer at the port of loading then could transmit directly to a computer at destination."

The retired naval officer mentioned that such a computer link now exists. The Atlantic Container Lines' New York and Le Havre ports talk via computers and exchange ship manifests and English-French translations of commodity identifications. Large shippers like General Motors and General Electric submit their monthly shipping data to the U.S. Customs Bureau on magnetic computer tapes which are compatible with the Bureau's own system.

Wills warned, however, that before computer links become widespread, companies must meet three requirements:

• The computer data must be

accurate and complete

• Companies must exercise care in adapting existing equipment and systems already in use for other purposes

• New computer systems and procedures should be introduced with caution.

A further problem in computerization is the development of a worldwide commodity code for data transmission. This code must serve the needs of transportation, marketing, accounting, claims, rate retrieval and other departments.

He noted that the benefits of the computer set-up would far outweigh the initial problems. One computer system on the drawing boards is similar to the type airlines use for reservation.

tions.

A central computer in the U.S. would reply to all container booking applications, accept or reject them, and assign space and routes. The computer would direct the nearest container to the pickup point, record the completion of loading and departure, and check on the shipment's progress through interchange points along the road.

It would then record the arrival of the container and shipment at the terminal, issue loading instructions and prepare all the necessary documents.

"Although it is a good way in the future," Wills stated, "complete computerization is the best answer we have to the shipping industry's paperwork jungle."

SALE

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We represent several terminal suppliers who are interested in reducing their inventories of equipment. All of the below listed equipment is offered at substantial discounts from manufacturer's prices:

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| TELETYPE model 33, ASR, 10 ops | 1,500 |
| OMNITEC COUPLER model 702 | 575 |
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These units have been used but carry an unconditional warranty. Equipment availability subject to prior sale.

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The system—called Stylair—has already been tested and proven in four states.

The full 25-question form which a woman fills out asks about her age, complexion, eyes, ears, face shape, other facial features and about special problems like oily hair or split ends. In return, she receives the computer's selection from 60 currently fashionable styles, complete with detailed instructions.

"The system is actually more complex than people think," asserts Neumann. The flowcharts alone fill 15 pages and an extensive matrix of values, established by Caruso, is provided for each hairstyle. The evaluation of each questionnaire consists of about 25,000 steps."

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100,000 More CDPs Are Needed, Professor Estimates

Society requires that doctors, lawyers, teachers, engineers, architects, chiropractors, optometrists, embalmers and realtors must possess certain qualifications or demonstrate specified skills in order to practice their specialties. In part this is

due to the personal nature of the service rendered and the need for confidential communications between the professional and his client.

As a member of society, I am glad that those requirements have been established.

They serve to assure me that the professional has been adjudged qualified to render the service which I might need. Like Vice-President Agnew, I do not want to undergo surgery performed by an unqualified surgeon.

Professionalism is also required in the data processing area because of the impact that the user of computers has on all of us. The lives of the majority of our citizens are probably affected more by the collective use of computers than they are by most of the professionals enumerated previously.

People have voluntarily supplied much information about themselves to the institutions with which we conduct "business." By so doing, we have tacitly surrendered a great deal of our privacy.

Let us hope that the data recorded is complete, accurate, and up-to-date. Consider the consequences if it is not. To date it has become great sport to blame the computer when things go

wrong. However, the computer is not at fault. *Data processing system* is at fault and the computer is only a part of that system.

It is as unfair to place the blame on a computer as it would be to take fault with the pencil a bookkeeper used to post an incorrect entry in a manual system.

It should be apparent that the individuals involved in planning, implementing, and operating the electronic data processing systems of today and tomorrow have a tremendous responsibility to society. The least they can do is to demonstrate an awareness of this responsibility. This can be accomplished in part by an internal program to establish a professional group.

The DPMA is trying to accomplish this with the CDP program. There are now approximately 11,000 CDP holders, but this is only a small fraction of the individuals functioning in the data processing area.

I would estimate that about one-third of the people classed as managers, systems analysts, and programmers could, and should be, certified. By my yardstick, we are short approximately 100,000 CDPs today. — Professor L.F. Bonnes, CDP, Purdue University.

CDP Is America's Major DP Examination

By the Society's Reporter

The Certificate in Data Processing, commonly called the CDP, is administered by the Data Processing Management Association (DPMA). It is awarded to persons who pass what is currently the major examination in the United States or Canada for the measurement of data processing capabilities.

There have been many attacks in the past on the examination, including an assertion that it serves only as a means of self-aggrandizement.

The purpose of the examination, and of the persons who take it, is far from that, however. This week's page includes statements from two CDP holders on their views of it and from a young man who objects to the recent dropping of the college requirements in favor of more experience.

Persons who would like to have more information about sitting for the CDP may write to the Society of Certified Data Processors, 633 Central St., Framingham, Mass. 01701, or to the DPMA, 505 Busse Highway, Park Ridge, Ill. 60068.



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Degree Resistance

Called Appalling

The requirements for certification have become more stringent with each examination. In 1972 a candidate was to be required to have a baccalaureate degree to sit for the examination. The successful resistance to this increase in required qualifications of a candidate is appalling.

We must look to the future because it will demand that one must be formally educated to achieve rank as a professional. A few will achieve the same competence and professional level without formal education, but fewer than yesterday.

We must distinguish those who demonstrate their technical qualifications and subject themselves to rigid professional disciplines. We must not diminish the prestige of the CDP by extending recognition to those not qualified.

In a recent meeting of the Los Angeles Chapter of DPMA, Herbert Safford, certification and testing chairman, DPMA Certification Council, indicated that 45% of those taking the CDP examination have degrees and 55% have some college.

We must not only raise the academic prerequisites of certification, but must also extend the examination to test technical competence in specific data processing fields as well as general knowledge in related EDP areas. Certification can only be meaningful if the body of professionals is large enough to establish high, difficult to attain, and rigid standards of certification. We must take a stand now and exclude any exceptions to the increased standards required of the profession.

Some competent professional people may be excluded from this recognition because of lack of qualifications, but we must make this decision. We must not abdicate our responsibility by sympathizing with those not having the courage and foresight to establish and personally attain high standards in our profession. They are not the professionals.

— Donald E. Oak, CDP, RFP, Education Director.

Young Men Objects

I object to the DPMA junking the "college requirements" in favor of more experience.

Experience is defined as being the number of years or decades one has been with a company, not one's expertise.

If DPMA and others would like to be picky, I recommend that they issue a test to see if one has enough knowledge to take the CDP test. — John C. Crook, B.S. '70, Baylor University.

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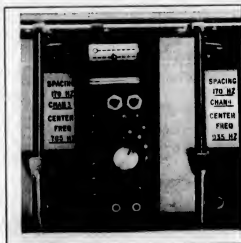


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Random Notes

Tektronix 4002 Users To Get Corning Graphics

BEAVERTON, Ore. — Tektronix Inc. has acquired the graphics software package designed for the discontinued Corning 404 Graphics Terminal.

The package will soon be made available for users of the Tektronix 4002A CRT terminal enabling them to generate graphic displays via a single sub-routine call, according to a spokesman.

The package will give 4002 users the capability to generate histograms, pie charts, and polar plots. It is expected to be available in October for a price "somewhat higher" than the existing, more-limited, 4002 package which costs \$950.

Mail Service Optimizes Cobol Source Decks for 360, RCA, HIS SILVER SPRING, Md. — A mail service for remote optimization of critical Cobol programs, known as Optimal, is now available from Optimization Sciences Inc. (OSI). The service provides individual Cobol source programs through OSI's Stage II optimizer and returns the optimized deck to the user ready for compiling and running. Optimal is available to any Cobol user, regardless of operating system, with any of the following hardware configurations: IBM 360, RCA Spectra 70, and Honeywell 200. Others including Burroughs and Univac will be available on October 1.

The cost of the service is \$50 handling charge per system entry plus \$25 for each individual program or subprogram and 2 cents per input card. OSI is at 818 Thayer Ave., 20807.

Philips Has P-360 Software For Apparent Billing Issue

NEW YORK — An automated invoice software billing system designed for medium-size apparel manufacturers has been developed by Philips Business Systems Inc. for users of the P-360.

The system will provide automatic pricing of styles, extensions, United Parcel Service and Parcel Post charges by zone, and insurance rate charges. "All the P-360 operator does is key in the style number, quantity, zone number and salesman," a Philips spokesman said. A billing line is then computed and printed on an invoice form automatically positioned for each operation, under software control.

The total system with a P-360 will sell for \$8,995 and lease for "less than" \$220/mo. Philips is at 292 Madison Ave.

Geom Package Helps Surveyors

UNION, N.J. — A coordinate geometry package for use by civil engineers, surveyors, and educational institutions is available on the Transnet time-sharing system to users in the metropolitan New York/New Jersey area.

Called Geom, the package runs on the Transnet PDP-8/i and is written in PALO.

The package starts with coordinate points in a tract and calculates significant angles, areas, bearings, and distances. It is written to suit the requirements of general surveying, a spokesman said.

Geom can be accessed at the normal Transnet connect time rate of \$10/hour. Educational discounts for remote classroom access are available. Transnet Corp. is at 2005 Route 22, 07083.

No Special Programming Needed

Data Analyzer Simplifies IBM Graphics

By Ronald A. Frank
Of the CW staff

NEW CITY, N.Y. — The Data Analyzer, a retrieval-reporting system available from Program Products Inc. (PPI), is designed for 360 and 370 users. The system is said to be adapted to graphic data presentations with an ability to present bar, graph, histograms, and cross tabulations, without special programming.

The Data Analyzer also provides users with computational capabilities for statistical functions such as mean value, variance and standard deviations. In addition the package can be useful in table look-up

work, averaging, and label writing, PPI said.

The system uses free form statements entered in a simple request. For graphic presentations a one-line call specifying the X, Y coordinates together with the control point at which the graphics will occur in a printout is all that is required, a PPI source said.

The Data Analyzer is written in Assembly Language and will operate "with any data base which can be processed by an IBM 360/30 with 32K and above." The system is presently operating with an IBM 2741 terminal in an interactive application, a spokesman said.

The modular extension facility of the system is said to provide the user with an "unlimited expandability" capability. Once system functions have been expanded by modifying them through a single call statement for a particular function or variable, they are automatically available for any file without reprogramming, PPI said.

The Data Analyzer can be installed within 30 days on any 360 (32K DOS or 65K OS) with a 2540 Card Reader/Punch, 1403 Printer, two disk units or one disk and three tape drives. A floating point hardware capability is required.

The system sells for \$15,000 for direct lease-and-purchase agreements can credit up to 60% toward the purchase price. A time payment plan available to three years at \$475/mo is available. Standard updates and three years' maintenance are included.

The Data Analyzer was developed by Information Sciences Inc. but the system is available from PPI, 18 Hempstead Rd., 10965.

Cats T/S System Offers Modular Approach for Burroughs Users

MIAMI, Fla. — A modular time-sharing system with flexible business-oriented applications stemtable from Mr. Brain Inc. — a data center originally established to service a local steamship line.

Currently operating with more than 25 subscribers, the Commercial Applications Time-Sharing System (Cats) allows multiple users with diverse applications to share the same programs without having common data structures or processing requirements.

It is written in Cobol for the Burroughs 2500 and 3500 systems and is available both as a service and on a purchase or lease basis for in-house use. A typical Cats "user model" for invoicing, inventory accounting, and accounts receivable is divided into three groups to allow selection of options.

The first group covers on-line invoicing, accounts receivable and operates in real-time mode with such features as cash posting, audit trails, and file maintenance. Off-line processing includes aged trial balances, sales analysis, stock status, and required statements.

The second group includes options for

remote batch jobs such as automatic back-order processing, multiple pricing structures, and interlocation transfers of stock.

The expanded applications group adds accounts payable, general ledger reporting, payroll, and purchasing.

The Cats system is compatible with Burroughs TC-500 and Sanders "Can Do" intelligent terminals but a spokesman said any EIA interface-type terminal could be adapted to operate with the system. A version is being developed for 360/370 users, according to the company.

The Cats system can operate in a minimum of 20K bytes but 30K bytes is preferable to reduce the Master Control Program overhead for calling the most frequently used segments.

For in-house use the Cats system costs \$25,000. On a lease basis it costs \$1,000/mo without support but including necessary documentation and updates of software changes.

On a time-sharing basis the system is also priced at \$1,000/mo for the basic application but rates can be higher depending on processing time and storage requirements. Mr. Brain Inc. is at 843 N.E. 2nd Ave., 33132.

Hotel System Handles Reservations, Bills

BETHESDA, Md. — The Hotel Management System (HMS), a time-sharing package that automates both front desk and back office operations for hotel/motel proprietors, requires no significant changes in existing hotel forms, according to Leasco Response Inc.

The system is modular and users can automate one application at a time as desired. Although exact rates depend on the size of a hotel, a typical 400- to 500-room property would cost about \$3,500 to \$4,000/mo.

HMS is written in Basic and implemented on the Response I time-sharing system which uses a Hewlett-Packard 2116 B with eight CDC disk drives, a spokesman said. The system can also be purchased by large chains for in-house use. Leasco is at 4833 Rugby Ave., 20014.

National CSS Users Save 70% With 64K Virtual Increments

STAMFORD, Conn. — New services and price revisions by National CSS Inc. will give the firm's users added flexibility at lower costs beginning this month.

Users can now add virtual memory in increments of 64K resulting in a possible reduction of 70% in connect time charges. Previously users were tied to virtual memory increments of 512K at \$4/hr but under the revision subscribers can add 64K additions at \$1/hr connect time.

A new OS/360 remote batch facility will offer a full MVT system to users in a 1 Mbyte virtual environment. Users can enter OS/360 jobs during the day and receive an immediate JCL syntax diagnosis, a spokesman said. Flagged errors can be corrected prior to processing the job in the evening to take advantage of lower rates.

The firm is at 460 Summer St., 06901.

Services Aid MDs, Landlords

PALATINE, Ill. — The Professional Billing System (PBS) for doctors and the Property Management System (PMS) are two services available from Suburban Computer Services to subscribers in the Chicago area.

PBS is now in use by a number of doctors and medical clinics for the preparation of bills sent directly to patients, and accounting information.

Both systems are written in RPG with some BAL modules and operate on Suburban's 360/30. PBS costs 30 cents per statement and PMS charges range from 50 to 80 cents per rental unit. The systems are available for in-house use at an unspecified purchase price. The firm is at 50 N. Broadway, 60067.

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MISSISSIPPI STATE CENTRAL DATA PROCESSING AUTHORITY
Advertisement for Bids

Sealed proposals will be received by the State Central Data Processing Authority, 508 Robert E. Lee Building, Jackson, Mississippi 39202, up until 2:00 p.m., Monday, September 27, 1971, for the following data processing equipment:

Request for Proposal No. 53 - Lease of four (4) video data terminals, four (4) data formats, eight (8) data sets, and four (4) buffers to interface with an RCA Spectra 70/46.

Detailed proposal specifications may be obtained from the office of the State Central Data Processing Authority.

The State Central Data Processing Authority reserves the right to reject any and all bids and proposals and to waive informality.

STATE CENTRAL DATA PROCESSING AUTHORITY

Charles L. Guest Executive Director

Where Does the Newcomer Begin?

Getting Started in Time-Sharing

By Ir Howard Row

Special to Computerworld

Properly used remote computing capability can mean dollar savings, increased service to customers and a significant decrease in detailed laborious calculations.

The general side-show antics of "pseudo industry suppliers" of the late 60's was neither representative or useful to anyone.

Let's clear away some of the underbrush and derive a few guidelines for the newcomer or potential newcomer to the field.

Begin by discounting talk of an imminent revolution in the terminal field that will obsolete everything in existence with a universally adaptable terminal. This mythology usually includes color CRT, Mag Tape, fast printers all connected to 5,000 char./sec data circuits with the entire package including easily modified software renting for something like \$100/mo.

Simple facts indicate existing terminals in the range of 15 to 30 char./sec have barely explored

potential. Interactive remotely accessible processors much above 30 char./sec are rare.

The super-terminal at low cost does not exist and is not about to be introduced. In like manner be careful of apparently low monthly rental rates for small stand-alone processors. You can expect actually gross expenses for these in-house installations to be 3-4 times machine rental.

During the past year significant advances have been made in packaged applications implemented on existing equipment that require almost no programming knowledge. As the industry matures applications packages oriented to the user will dominate the field and it's about time. Watch for them in your specialty.

Some practical considerations to be considered from the experience of the past few years are summarized below.

No attempt to be rigorously definitive has been made but the time, dollars and just plain lumps taken by the industry and customers involving hasty decisions in these areas is considerable.

1. Have Well-Defined Objectives and Give Yourself Reasonable Time to Attain Them.

Study your application area in detail. Be result-oriented rather than tradition bound.

This will prevent you from putting unnecessary restrictions on problem solving techniques as well as making excessive demands considered as a safety factor. Be generally cautious with consultants unless they have proved performance records.

Try and find out what's been done in your field. Examine past successes and failures; a complete bomb-out for someone else could be a profitable application for you.

2. Don't Attempt Your Own Software Unless You're Good at It.

There is an unfortunate tendency for many remote computing service companies to give the impression you must become somewhat of a programmer.

Software is actually the unfinished logical design required to make the processor perform your application. It should be no more a requirement for you to become a programmer to handle the software than to become an electrical engineer to operate the hardware.

3. Take Advantage of the Rapidly Improving Situation in Packaged Applications.

During the past year easy to use application packages in the fields of General Accounting, Cash Flow Forecasting, Insurance Illustration and Stock and Bond Analysis have become available from several companies. These systems are not universally applicable but they are worthy of study.

4. Start With a Simple Terminal and Add Capability As You Need It.

The ubiquitous teletypewriter is noisy and leaves something to be desired in print quality, but if it's just answers you want for the lowest dollar, these machines are hard to beat. Selectric typewriter terminals are slightly more expensive with improved print quality as well as advantages of operation ease for most office personnel.

5. If You Feel Comfortable With Punched Cards You're in Good Company.

Over 80% of data processing installations are punched card oriented. They will remain so for a long time. A punched card can be read in English, it's easily changed, can be read directly to your time-sharing service from a remote location and the world is full of people who understand them.

It's also possible to load cards onto the cassette-tape machines for storage or higher speed transmission if this is required.

In summary, there is no revolutionary low-cost high-performance terminal in the near future. Study and take advantage of complete applications and look for simple operating techniques and equipment that can be used by your regular personnel.

I.H. Row is with Western Telematic Inc.

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CW-4

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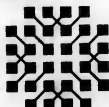
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User Precedents Seen

AT&T Challenges Rochester Interconnection

By Ronald A. Frank
Of the CW Staff
ALBANY, N.Y. — AT&T has challenged the data interconnection plan of Rochester Telephone Corp. and the resulting regulatory battle may set important precedents for users of non-carrier supplied equipment.

Testifying at continuing hearings on the Rochester plan before the New York Public Service Commission (PSC), Lawrence Hohmann, AT&T engineering manager, said the proposal gives "no indication that Rochester has a set of standards applicable to all types of terminal equipment."

Commenting on the Network Protective Device (NPD), Rochester's equivalent of the Bell Data Access Arrangement (DAA), Hohmann said the NPD "per-

Communications

forms no protective function whatsoever," and "does not protect the network as do the Bell System protective connecting arrangements."

Hohmann officially testified for the New York Telephone Co., since it is most directly affected by the Rochester plan, but he obviously repre-

sented AT&T and the Bell System operating companies in his warnings that the proposed tariff could harm the telephone network.

Although constrained by the continuing hearings from making formal statements, it is known that Rochester Telephone and PSC officials disagree with AT&T's opposition to the interconnection proposal. These officials are increased particularly at Bell's attempt to discredit the plan from a technical standpoint.

In his testimony Hohmann said Bell customers and facilities could be affected by the lack of necessary network safeguards built into the

Rochester plan, which includes equipment certification and inspection together with the NPD.

A Rochester Telephone spokesman said the independent carrier had given every careful consideration to all facets of the interconnection picture including the interconnection (through Rochester lines) of non-carrier supplied data equipment with the Bell network.

The PSC staff is also known to be eager for the change to cross-examine Hohmann. In earlier sessions on the Rochester plan, the PSC staff recommended approval of the interconnection tariff. And although any recommendation from the staff will not be binding until the commission rules on the matter, the PSC staff apparently has not been impressed by AT&T's position.

As part of Hohmann's cross-examination, Rochester will undoubtedly attempt to prove the NPD and certification are just as effective as the Bell DAAs.

If the PSC ultimately rules that Rochester Telephone can implement its simplified interconnection plan, other independent companies will probably file similar tariffs.

More importantly, the FCC sponsored FBX study group which ultimately may look at all forms of interconnection will have an important alternative to Bell's connecting arrangements to consider. This committee hopefully will set interconnection standards and AT&T would like to have its DAA plan approved.

The hearings are scheduled to continue on September 15.

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Data Briefs

Modem Can Handle Data And Voice Simultaneously

JERICO, N.Y. - Phonplex Corp. has developed a modem capable of simultaneously transmitting data and voice information. Designated the DVM 1300, the unit is said to eliminate the need for maintaining separate voice and data facilities.

The 1,300 bit/sec capability of the unit can be multiplexed to provide "up to 10 Teletype channels in addition to a voice channel." It can operate in full duplex on private lines or half duplex mode on the dis-up network.

Although the simultaneous transmission concept is appealing from the standpoint of savings in line facilities, the dual use of a single voice grade line would probably degrade both the voice and data quality, according to one observer.

The DVM 1300 is priced in the \$2,000 range in quantity orders but single unit prices could not be quoted, the firm said. The modem is expected to be ready for first shipments within "several months." Phonplex is at 410 Jericho Turnpike, 11763.

Tester Isolates Line Faults
STAMFORD, Conn. - A diagnostic test device introduced by Data Products Corp. is designed to isolate faults in data transmission systems.

Called the Detect system, the unit is plug compatible with all data sets (Bell and non-Bell) and terminals with standard EIA interfaces. The unit is installed between the data set and terminal in a communications line.

The device costs \$350 and will be available in November from Data Products Corp., 17 Arnelia Place, 06004.

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September 15, 1971

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Bits & Pieces

360 Replacement Cores
Use Coger Semiconductors

MELVILLE, N.Y. — Potter has jumped into the 360 core replacement market with a semiconductor unit supplied by Coger. The Potter memory has 200 nsec access time, and Potter is suggesting that even though the extra speed doesn't increase 360 throughput, users will be able to keep their core boxes when they change to faster CPUs. Going all the way, Potter is also offering to double the maximum core size available from IBM: they will take a 360/30 to 128K, a 40 to 512K, a 50 to 1M and a 66/67 to 2M.

Potter Instrument Co. is at 532 Broad Hollow Road, 11746.

Office Units Use Mag Stripe
SAN LEANDRO, Calif. — Singer's Division has a new series of billing and accounting machines, the Series 5800, based on use of magnetic stripe cards. The series is available with dual independent printers, and, due to its modular architecture, can be enhanced with more memory or peripherals without reprogramming. Prices for various models range from \$12,000 to \$30,000 with lease terms available. The Series 5800 is at 2350 Washington Ave., 94077.

Tektronix Plotter Costs \$2,650
BEAVERTON, Ore. — The Tektronix 915 X-Y plotter lists the company's calculators make graphs, plots, and charts on 8-1/2 by 11 in. or 11 by 17 in. graph paper. The unit costs \$2,650, and will be available in December. Tektronix can be reached at Box 500, 97006.

H-P Offers Hardware Fourier
PALO ALTO, Calif. — Two new peripherals for Hewlett Packard minicomputers give hardware capability to do Fourier analyses and other signal and time-series calculations.

The 5371A Fast Fourier Transform Arithmetic Unit can do a 1,024 point transform in 160 msec, allowing real-time power spectrum analysis to frequencies beyond 2 kHz. It operates through any H-P Fourier Analyzer. The 5471A costs \$4,500.

Going up an order of magnitude, the 5470A Fast Fourier Processor can do a 1,024 point transform in 15 msec, permitting analysis up to 20 kHz. The \$25,000 unit can be used on any mini, but it is supplied with an interface and software driver for H-P models only. Hewlett Packard is at 1001 California Ave., 94304.

As Fast as 200 Nanosec

PDP-8 Replacement Has Semi Memory

FAIRFIELD, N.J. — A 12-bit, general-purpose minicomputer with two memory options, Digital Computer Controls' D-112H, can have a core memory with 1 μ sec cycle time and a semiconductor, random-access, bipolar memory with instruction times of 200 nsec (with overlap) and 300 nsec (without overlap).

The D-112H's processor is capable of operating with either or both in the same system by performing in two different timing modes. The normal mode is used when the processor is referring to the core memory and the fast mode when the processor references in the semiconductor memory.

The semi-conductor memory consists of modules of 256 12-bit words.

Each of eight PC boards in the main console can store 4K 12-bit words of core memory. The semiconductor memory is substituted by replacing a core board with a similar board on which four 256-word modules can be placed.

Thus, 1K words of semiconductor memory can replace 4K words of core memory.

The D-112H is fully parallel and compatible with DEC PDP-8 computers. The

basic central processor is organized to interface with a general-purpose I/O device. Heart of the processor is the MSI arithmetic logic unit which controls information transfers between five main registers (ACC, MQ, PC, MA and MD) and a sixth three-bit register (IR).

Several significant processor IOT instructions, not available in the latest PDP-8, are included with the standard set, DCC said. An efficient microprogramming technique minimizes use of standard codes, DCC added.

Two types of I/O interface can be provided with the D-112H. One is an external micro I/O transfer compatible with those in a standard D-112. It provides the program control IOP generator and all interface signals for the I/O and data bus transfer.

In a minimal 4K core configuration, the D-112H sells for \$5,900. A teletypewriter costs \$1,250 more. With 4K of core and 1K of semiconductor memory, the price goes up to \$8,000.

DCC is at 12 Industrial Road, 07006.

2100A-Based Mini System Gives
Data Base Management Capability

PALO ALTO, Calif. — Hewlett Packard has combined its 2100A minicomputer with a moving head disk and software for extended disk file management, and come up with the 2120A system for dedicated data base applications.

The system gives users file management capabilities typically found only in larger

systems, H-P said, and offers flexibility to users of data collection and data base systems.

The 7900A moving head disk stores 5M 8-bit bytes with an average access time of 35 msec. The drive uses a single permanent disk and an interchangeable 2315 type cartridge which can be changed in less than a minute.

The H-P 2883A disk drive can also be added to the system, giving it another 23M of on-line storage. The 2883A uses 2316 type disk packs.

16-Bit Unit

The 2100 CPU is a 16-bit machine, with core sizes ranging from 4K to 32K, and a cycle time of 960 nsec. The control logic is microprogrammed, and hardware floating point is available as an option.

A full range of DOS software, as well as other peripherals, is available.

Prices for the system begin at \$32,950, including software and support, H-P said. Deliveries are scheduled to begin this fall. Hewlett Packard is at 1501 Page Mill Road, 94304.

Graphics Design System Operates
Either by Itself or On-Line

BURLINGTON, Mass. — Applicon Inc. has announced a turnkey computerized graphical design and drafting system for printed circuit boards, integrated circuits, hybrid circuits, and schematic drawings.

Called the Design Assistant 700, the system is constructed from modules each capable of stand-alone operation.

Several terminal modules can be connected to a central communications and file storage facility. The system offers complete flexibility with typical disk or plotter options.

The modules can be remotely located any distance from each other or a file storage device without affecting design response time.

The Design Assistant/700 can be interfaced to other computer-aided design graphical and drafting system machines and may be connected as a remote terminal to larger computer systems, Applicon said.

The system accepts freethand input on a drawing table and plots complete documentation. It can manipulate graphical data in digital form and prepares numerical control data automatically.

Drawing table resolution is one part in 32,768 along each axis, and window

manipulation capabilities include magnification changes, fit, zoom, centering, and two axis movement.

A disk memory of 4M (byte) capacity is standard, as is a magnetic tape cassette subsystem. The processor for the unit is a DEC PDP-11.

Basic price for the system is \$60,000, and delivery is 90 days for standard equipment. Applicon is at 83 Second Ave., 01803.

Print Terminal Has 128 Char. Set

PROVIDENCE, R.I. — Computac Corp. has announced a 10 to 30 char./sec heavy duty printing terminal with full alphanumeric I/O, a 132 char. line, and multi-copy printout capabilities.

The terminal has a built-in acoustic coupler. It can send the full 128 char. ASCII code set, but prints only the 64 char. subset (all caps).

The impact printer has an ink impregnated roller, and operates with sprocket feed paper to produce from one to six carbon. Standard features include full and half duplex, parity check for errors, and a carrier detector.

The keyboard is solid state, magnet actuated with "N" key rollover to assure positive sequence of data entry. The coupler has active filters to eliminate line and environment noise; its out of band attenuation is greater than 50 dB.

Offline, the unit can be used as an operator-oriented work station for low cost printing.

The heavy duty terminal, Model CD 3000, sells for \$3,490. Leasing arrangements are available as low as \$127/month.

Computac is at 100 Manton Ave., 02909.

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This is Data Products' new portable communications test equipment: the 404 Pattern Generator and the 404 Data Analyzer. Pocket-sized and priced under \$500 each. High capability. True start-stop distortion measurement with choice of four selectable rates and 5- and 8-level "Fox" test messages.

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Boston Braces for IEEE, Groups Ready Two Shows

BOSTON — Three operating computer networks will be examined at one of the technical sessions during next week's IEEE Computer Society Conference at the Sheraton-Boston Hotel.

Attendees will also be admitted free of charge to the Northeast Electronics Research and Engineering Meeting (Nerem), Nov. 3-5. This IEEE function will be held in the same hotel and in the adjacent John B. Hynes memorial Auditorium.

Next week's conferees will hear George Hicken of the National Security Agency discuss that government office's network, after which Dr. L.G. Roberts will view the cost and projections of the Defense Depart-

Societies/ User Groups

ment's Arpa system.

On the civilian side, Thomas O'Connor of Eastern Airlines will lecture on computer networks in the airline industry.

Several user applications will also be examined, while other portions of the conference will keep the traditional "designer" aspects. There will be no commercial exhibits.

The meeting, Sept. 22-24, is the first sponsored by the Computer Society of IEEE since it changed its status from special interest group.

Conference Chairman Richard H. Battin, of MIT Draper Laboratory, noted the pre-registration total of 110 was "substantially higher" than last year's conference of the IEEE Computer Group, which attracted more than 1,000 persons.

Nerem Symposium

A two-day medical engineering symposium will be one innovation at Nerem, officials noted. There will also be separate conferences on transportation, pollution measurement and control, solid state devices and circuits, and computer applications.

The regular technical and applications program will feature over 64 papers in a score of sessions, ranging from a panel discussion on urban affairs to laser applications in transportation and environmental systems.

Information on Nerem is available from the meeting's business officials, 31 Channing St., Newton, Mass., 02158.

Canada Official Opens DP Confab

TORONTO — Canada's newly-appointed Minister of Communications, the Hon. Robert Stanbury, will make one of his first public appearances when he "cuts the ribbon" at this week's Canadian Computer Show here, to be held in conjunction with the Canadian Computer Conference. Both events are sponsored by the Canadian Information Processing Society (Cips).

The conference will include discussions of programmer accreditation and DP security. Equipment displays will be in the Automotive Building at Exhibition Park; the technical sessions are booked for the Royal York Hotel. The show and conference will run concurrently, Sept. 15-17.

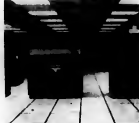
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Supplies Group Sets Show for October

CHICAGO — The Data Processing Supplies Association (DPSA) will hold its annual Input/Output Systems Seminar here, and anticipates that a capacity crowd of 500 will attend the Oct. 12-14 meeting at the Regency Hyatt House.

Major peripheral manufacturers

OCR Users to Discuss Fonts, Forms

CORPUS CHRISTI, Tex. — Users of OCR equipment will hear of standardization problems with different fonts when the OCR Users Association meets here Dec. 8-9.

Along with end users, associate members representing the industries that supply OCR equipment, supplies, and the OCR environment will participate in three technical sessions.

Howard Casey, chairman of the association's Document Evaluation Committee, will conduct one meeting on "the forms industry and the user."

Other discussions will center around the failure of OCR use to

are expected to illustrate equipment, supplies and services, and presentations will include: card oriented peripherals, plastic card terminals, perforator tape, EDP printers, OCR/OMR readers, key input, and voice response. Panel discussions concerning the state of the art of most of

fulfill growth projections, and the standardization "controversy," the group said. Information is available from President Ralph R. Brouwer at 9415 S. Western Ave., Chicago, 60620.

these areas will also be held.

Three Levels

The trade organization has about 150 members in its four divisions, including three levels of membership: active for U.S. and Canadian manufacturers of products; associate for U.S. and Canadian suppliers of raw materials; affiliate for foreign manufacturers of industry products and suppliers to those manufacturers.

Information is available from Executive Director C.A. Great-house, P.O. Box 1333, Stamford, Conn. 06904.

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Six Managers View Technological Changes

By A.G. Hanlon
Special to Computerworld
Technological Change and Management, The John Deibel
Lectures, 1968-1970, David W.
Ewing, editor, Harvard University Press, Cambridge, Mass., 1970, \$6.

Lectures of six eminent indus-

trialists given at the Harvard Business School are assembled into one volume.

Donald C. Cook, president, American Electric Power Co., Inc., reviews the accelerating effect of "breakthrough" in modern technology with its attendant synergism.

He reflects that man lags technology because "he faces the dual challenge of continuously adapting his technology to suit his own nature, capacity and desires, and himself and his society to meet the demands of his technology."

Eli Goldston, president, East-

ern Gas & Fuel Associates, suggests that the scientific limits of technology are beyond imagination, but that limits imposed by humans (such as opposition to change) tend to retard technological development.

With the advent of professional managers, skilled in production and marketing, more time is made available to the entrepreneur for developing opportunities, assessing social needs, and application of new technologies, according to Joseph C. Wilson, board chairman, Xerox Corp.

Charles B. Thornton, board chairman, Litton Industries, Inc., indicates a less formal corporate structure, with a minimum of committees and conferences, and with a maximum decision flexibility for managers, promoter initiative and interchange of ideas.

The advantages and problems of a multinational company with management by nationals of all countries are discussed by Woodroffe, chairman, Unilever, Ltd. He theorizes that the multinational organization aids world economic development and permits worldwide sharing of technological progress.

James E. Webb, NASA administrator, reveals aspects of management required for space programs that are generally more constraining than those in "normal" business operations.

For instance, high-reliability requirements in areas of new and untested technologies in order to explore unknown developments in the space program create complex management problems.

For those who aspire to corporate level management, this series of lectures will possibly reveal intricacies of management philosophy and execution that will broaden their horizons to include considerations for applying technology to meet social needs.

A.G. Hanlon is with NCR, Data Processing Division, San Diego, Calif.

Book Reviews

Text Discusses All DP Aspects

By W.S. Hoffman
Special to Computerworld
Automatic Data Processing, Second Edition, Elias M. Awad and the Data Processing Management Association, Prentice-Hall, Inc., Englewood Cliffs, N.J., 1970, 495 pages, \$11.95.

This book presents a broad and thorough discussion of all aspects of data processing systems and is designed for use in a one- or two-semester introductory course. Subjects covered range from punched card DP techniques to basic concepts of electronic data processing including coded data representation, CPU operation, and input/output logic.

Computer programming is discussed thoroughly starting at the flowchart level and proceeding through program preparation, machine and assembly language concepts, and an introduction to the Fortran, Cobol and PL/I higher level languages.

Separate discussions cover batch and real-time processing and file organization and includes sequential, indexed sequential, and random processing. The chapter on documentation techniques is good.

This book is perhaps best used by someone who has no familiarity with data processing.

W.S. Hoffman is with the Information Systems Division of DuPont de Nemours Inc.

What a Title!
MORGANTOWN, W. Va. — Textbooks are often given to long titles, but WVUCPUWAT-RJE has got to be one of the strangest. The book is a primer on how to operate a computer from a remote terminal. The subtitle says, "Give It a Try. It Can't Be Worse Than the Title."

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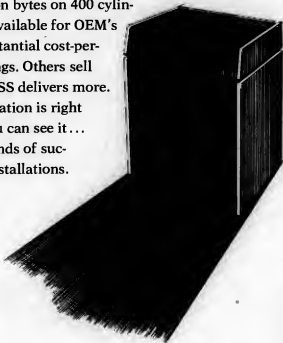
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Reflections On Ifip '71

CW European Bureau

LJUBLJANA, Yugoslavia—More than 2,700 participants registered at the Ifip '71 Congress as visitors learned the latest IFIP developments and had the opportunity to become more deeply involved in the international economic situation of today, adding their voices to those already requesting a planned development for the emerging countries of the world.

With all these ingredients for success, however, the Congress failed in one respect at least. It's "internationalism" was marred by the non-arrival of 650 registrants, a disproportionate number of these being from the Eastern bloc countries. Whether it was the worsening political situation between Yugoslavia and the Soviet bloc, or some other reason that kept people from these countries away, remains a puzzle; but the organizers were clearly expecting more, particularly from the USSR (which sent only 17 delegates) and from East Germany (which sent 16).

Only Hungary, from among the East European countries, was well represented with 125 delegates.

Something for everybody appeared to be the policy at the Ifip conference, the technical sessions being split into seven topic areas, and supported by more generalized symposia, evening sessions and invited papers.

None of the topic areas, and few of the papers, could be justified against the chosen "theme" of the Congress "Develop the Underdeveloped."

Only the sections dealing with Sciences, Humanities and Education could possibly be construed as directly relevant to the theme, but even this was surrounded by



Philips demonstrated its P850 on the exhibit floor. (CW Staff Photo)

papers of academic interest only, with little relevance to developing anything.

By default, other papers may have helped "develop the undeveloped," simply because they were presented in a developing country to an audience partially drawn from other developing countries (although upwards of 65% of the delegates were from the developed countries of Western Europe and North America). The real task of promoting the Congress theme was, however, left to the "symposia"—most of which turned out to be simply further sessions of unpublished papers—and to the evening sessions.

Here, the value of computers in the administration of an emerging country was stressed and the need to create a supply of trained personnel within those countries to work these computers was made evident. It was perhaps a pity that nobody suggested how the computer could become an asset to a developing country, or how relevant an education in computer science (the lack of which was the main point of emphasis) was to the tasks which the machine could best perform for those countries.

As to the exhibit, interest appeared to be centered on the mainframe manufacturers, although the supplies companies and one British used machine broker claimed to be well satisfied.

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CI Notes

Display Rise Seen

PALO ALTO, Calif. — During 1971 alphanumeric displays representing 34.3 million characters and worth \$73.9 million will be deployed in U.S.-made equipment, but this will rise to 81.2 million characters worth \$101.4 million by 1975, Quantum Science Corp. predicts.

Of the total by 1975, a little over half the total characters will be in CRT display systems used in computer terminals, the report said, and decoder/drive electronics will account for 46% of the total 1975 market value for all display systems.

After 1975, however, the character display requirements for the consumer sector will more than double each year for the following four years.

Ampex Raises Prices

CULVER CITY, Calif. — Ampex Corp. has become the first in the computer business to raise prices as a result of the new 10% surcharge on imported equipment.

The new price increases, which range from 1% to 7%, affect Ampex's line of core, tape and disk equipment manufactured outside the U.S. and shipped to domestic firms. The largest price increases will come on core products, which have the highest overseas value content.

RCA Protests Patent Pact

WASHINGTON, D.C. — A top official in the U.S. Patent Office is alleged to have overruled an evaluation committee's "favorable report" that would have purportedly awarded a competitive bid to RCA over IBM. The two companies were the only bidders.

In a protest filed with the General Accounting Office, RCA stated: "It seems clear that our technical presentation was well received by the technical evaluation committee... While we have, of course, not heard or requested access to the report of that committee we firmly believe that it was favorable to RCA. We also believe based on the absence of the members of that committee from subsequent meetings that its membership was changed following its issuance of a report favorable to RCA."

Supershorts

Comma Corp. has signed an agreement with Intel Corp. that authorizes Comma to enter into computer maintenance contracts with Intel's Computer Leasing Corp. customers.

Industrial Leasing Corp. has signed an agreement with Incoform Corp. for underwriting the worldwide leasing and rental of all Incoform products.

Electronic Memories and Magnetics Corp. has formed Memory Products Group.

Sorbus Inc. has signed maintenance contracts with Datatype Corp. and Graham Magnetics, Inc.

Interdata, Inc. has signed a marketing representation agreement with Datronics Pty. Ltd. of Sydney, Australia.

Compaq Reaction

CLA Will Implement Some Report Ideas

By E. Drake Lundell, Jr.

WASHINGTON, D.C. — While it is unlikely that the Computer Lesors Association will implement all of the recommendations contained in the Compaq study of 360 enhancements (CW, Sept. 8), the group is now studying which show the greatest promise.

Association executive James Benton said that the CLA would not at first design projects to implement all of the possible enhancements because many were already available from independent firms and the CLA thought that others would become available in the near future.

At the same time, Benton said that the Association has been meeting on the recommendations in the report and would meet again in early October (4-5) to discuss which of them to implement or to award development contracts on.

There are more than 2,000 360 CPUs owned by the 11 member firms of CLA — all of which the lessors want to keep on lease for at least two more years and for as much as six years.

The study said, "an increasing level of system support will be required to keep CLA members' equipment in place, or to lease it to the next user."

"The day is past when IBM determines what configuration the customer wants and then the leasing company steps in to offer him that configuration at a lower price. Not only is this system support required at lease termination time, but a continuing level of systems engineering is advisable to keep end users unskilled on System 370 and to help them determine ways to enhance their systems to make those systems more cost effective."

The Compaq study also recommends "that CLA, or its members, be prepared to offer a measurement and analysis service. Only through use of this kind of service can the improvement to be realized by introduction of a particular enhancement be estimated reliably for a specific end user."

The enhancement area that will require the largest amount of development on the part of outside firms is in the software field and the CLA will have to spend a good deal of money if it wishes to develop the packages needed in this area.

In addition, "Software enhancements, particularly to the Operating System, imply that CLA or its member organizations will require the support of a software staff on a continuing basis."

Russians Using Used 360/40 Purchased From U.S. Broker

WASHINGTON, D.C. — A used IBM 360/40 is now up and running in Moscow. It is believed to be the only computer of this type in the USSR at the present time.

The system was sold as part of a \$1 million-plus turn-key effort by Intercontinental Computer Exchange Inc. (ICX), through a Dutch trading company in Amsterdam.

A recipient was the Russian Ministry for Radio and Telecommunications, an official government agency, which will use the machine in a consumer television factory in the Moscow area.

"Under Russian law, the Ministry got the machine through Mashpriborintorg, the Soviet purchasing agency for computers," said Dale P. Lewis, ICX's president. He declined to name the Dutch trading company involved in the transaction.

"We consolidated pieces of the system from several sources," said Lewis, "and we installed the entire computer center, including the power unit, air conditioning, etc., for the Russians."

ICX is also supplying the software, spare parts and will handle maintenance of the system itself. "We have people in Eastern Europe," Lewis explained, "but I can't say at this time where we're working out of."

The ICX executive emphasized that IBM "had absolutely nothing to do with the sale."

A spokesman at IBM World Trade Corp. in New York City when asked if he knew of any Mod 40's installed in Russia said that he knew of only one, placed by a lease company. But IBM, he added, had not installed any itself.

In running down the history of the Mod 40 sale to the Russians, Lewis said that ICX got its machine in order it took between 16 and 20 weeks for the U.S. Department of Commerce to grant the necessary license for the transaction. Under current export law, every computer

sold behind the Iron Curtain must have a separate license in order to prevent sale of possible strategic goods to Communist countries.

ICX is a relatively new company, in business since June 1970. The firm purchases computer equipment primarily in the U.S. and sells overseas. "We have offices in Kansas City, Los Angeles and Washington, our main offices," Lewis said. "We also have agents in Scandinavia, Mexico, Brazil, Israel, Spain, Japan and Australia." He would not comment if ICX had representatives in Eastern European countries.

The company has installed several used computers in Western Europe, including a 7094 in West Germany, and a 7074 with two peripheral I/401 systems in Sweden.

System Development Execs Planning Hardware Entry With Intelligent Terminal

SANTA MONICA, Calif. — Officials at System Development Corp. are presently sweating out a decision that could change the entire nature of that firm's business — the decision on whether or not to enter the hardware business.

Systems Development, which was founded by the Air Force to provide programming support to government agencies, became a public firm just a few years ago, and now is contemplating getting out of its heavy emphasis on software and into the hardware field.

The first product would be an intelligent terminal that is already up and working at the firm's headquarters here. While the present system is designed around a Data General Nova 1200, the system could use any minicomputer.

If the decision is yes, the system would probably be shown at the Fall Joint Computer Conference in November.

"Correction of errors, modifications to accommodate new functions or equipment and just answering questions about the program all contribute to this requirement."

"Theoretically, these functions could be assumed by the company that developed the program; practically, unless all of the programs are developed by the same organization, a central clearing house for these functions is needed," the Compaq study said.

Major enhancements the study mentioned include Cobol optimization; redefining DOS by correcting areas of inefficiency such as the macro assembler and the link editor, replacing the I/O supervisor for both OS and DOS, rewriting load modules for the two operating systems, and developing an I/O supervisor.

The report also suggested development of peripheral I/O processors, estimating that it would take \$200,000 and 15 months to do the job.

Compaq said lessors should begin configuring 40-65 or 50-65 systems as enhancements to present Model 65 installations.

To configure the Model 30 into a stand-alone remote job entry system, Compaq estimated hardware development costs at \$25,000 and software development at \$50,000. Compaq said the job could be done in six months.

In memory related enhancements, Compaq noted that memory expansion units are presently available from both independents and IBM. The study urged the lessors to make OEM arrangements with particular sectors for quantity discounts and that lessors should work out specific maintenance plans.

In I/O related areas, Compaq said off-line print stations are currently available for \$1,000 to \$1,500/mo and the lessors should attempt to work out quantity discounts.

Compaq also urged the modification of 2314's by doubling the number of tracks, replacing the hydraulic head positioner mechanism with voice coil actuator and electronic detent.

Compaq estimated the cost of modifying the 2314 at \$100,000 or approximately \$3,500 per spindle retrofitted. It estimated that it would take six months before modifications began.

The Compaq report sees little hope for reemploying the lessors' inventory of 2311s. "The 2311 was impacted early in its product life cycle by the probability of its revival by enhancement must be viewed against the backdrop of the competitive environment of the 2319 and the 2314/2319 compatible drives offered by independent manufacturers."

Although Compaq considered a number of 2311 enhancements, it concluded the cost would be prohibitive. The alternative market outlet for 2311s may only be for systems that would employ only one unit, where capacity is of less concern, and where lower data rates are demanded.

"One imagines here a disk employed in a small business system (like System/3), or a disk buffer used in conjunction with a programmable source data collection device."

A design study to develop a 3330 adapter for System 360 would take three months, Compaq said, and cost \$15,000 to design the hardware and software.

Korean Government Backs Conversion

CW Washington Bureau
NEW YORK — It all started at a cocktail party a little over a year ago.

Initial contact was made between the South Korean Government and Keyboard Training Inc. which led to establishment of a conversion data center in Seoul — a joint venture between

KTI in the U.S. and a large South Korean industrialist, J.K. Suk.

Initial capitalization was \$400,000 — three-quarters of it put up by Suk and the rest by KTI, although the venture is a 50%-50% partnership, according to Keith V. Cousin, president of the American company. "Suk felt that the contribution being made by Keyboard to the venture was far greater," Cousin said, explaining the disparity between the investment and the sharing of proceeds.

"With the formation of the company, Korea Keyboard Ltd., the Korean government also approved a loan of \$1 million to be used not as operating capital but for the purchase of additional equipment," the president added.

The facility, which presently does work almost exclusively for the American banks, insurance companies and publishing houses, converts substantial volumes of source records to compact computer-ready magnetic tape.

"We have the ability," Cousin said, "to convert 40 or 50 million insurance records to magnetic tape, for example. There's no way a company in this country can accomplish this in house. To do it domestically via a service bureau would be too costly."

The major conversion jobs KTI undertakes in Korea are those in which time is not a critical factor — where turnaround time is up to two weeks.

What is critical is the price, for it is here that Cousin sees the Korean operation providing the best advantage.

The average keypunch operator in the Seoul operation makes about \$60 a month in cash, compared to her American counterpart who gets about \$125 to \$135 a week.

"The salaries in Korea are proving to be higher than anticipated," the KTI president interjected. "Initial information was that salaries would average \$9 to \$10 a week. The disparity is mainly a feature of doing business in Korea; they didn't tell us about the little fringes and bonuses."

"Training girls in Korea for this type of work," said Cousin, "is easier. A keypunch operator is almost an elevated position there. These girls have natural physical dexterity, and 'oriental concentration' makes them superb students."

Emphasizing the quality of work performed, Cousin cited a fairly complete typesetting program which involved long codes. The error rate was 0.005.

Most of the operators are high school graduates and several also have college degrees.

"I don't think we're in direct competition with American labor," added Cousin. "Our end product is beneficial to the American economy and hence to the American worker in that economy."

The success of the Korean operation is leading the company to contemplate establishment of similar conversion data centers in a number of cities in the U.S. which would handle the jobs with short turnaround times. The initial American center would be in New York.

Rhonda Jarman, an OIC student, demonstrates donated Keytape for Gary Robinson, executive director of OIC of Greater Boston Inc. and Edward C. Lund, vice-president and general manager, North American Operations of Honeywell Information Systems.

Honeywell Donates Keytapes, Cash For OIC Job Training Programs

BOSTON — Two Honeywell Keytape devices, valued at about \$9,000, have been installed at the Dudley Street Opportunities Industrialization Center (OIC) in the Roxbury section here and a substantial grant has been made by Honeywell toward the job training center's 1971 fund-raising goal of \$250,000.

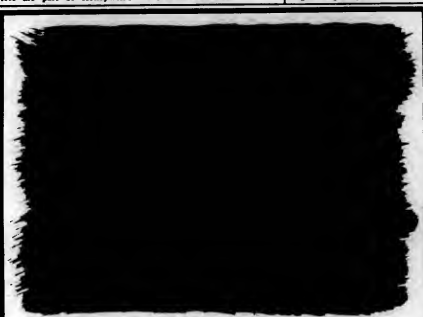
"The grant and Keytape devices are part of Honeywell's

continuing efforts to help support job training programs and equal employment opportunities for minority groups," said E.C. Lund, Honeywell Information Systems' vice-president and general manager for North American Operations. He made the presentation to Gary Robinson, executive director of the Opportunities Industrialization Centers of Greater Boston Inc.

ANN ARBOR, Mich. — Sycor, Inc., has awarded a 25 million bit dynamic memory contract to Mostek Corp.

Under the terms of the pact, Mostek will supply Sycor with 25,000 pieces of second generation MOS-LSI dynamic RAM (Mostek type MK 4006P) for incorporation in the Model 340 Data Communication Terminal produced by Sycor. Each module of the dynamic RAM from Mostek will contain 1,024 bits of memory, the first said.

The lower DC voltage power requirements of the Mostek RAM will improve terminal performance margins and lead to greater reliability, according to Raymond P. Kavick, Director of Engineering at Sycor.



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Contracts

Data Printer Corp. will supply Model V-132-C line printers to Compust Corp. under a contract that totals about \$500,000. The contract is scheduled for completion in late October.

Ultronic Systems Corp. will install communications equipment with a value of \$300,000 in the TWA Programmed Airlines Reservations System. The equipment will include Ultronic Data Network Management Control Center and 152 Data Pump 201/2490 dial-up modems.

The Michigan Automobile Insurance Plan has selected University Computing Co.'s facilities Management subsidiary, Computer Technology Inc., to develop an operational initialment payment system.

Logics Ltd. will study a new computer network designed to provide facilities for international payment transfers between banks throughout Europe and the U.S. under a contract funded by 70 commercial banks. The Logics study will be a sub-contract from Greenwich Data Systems, Inc.

Softach Inc. will implement the AED programming language on the Control Data 6000 series of computers under a \$105,000 contract awarded by the U.S. Naval Weapons Laboratory.

Engineering evaluation, validation and software development

for the Air Force Miniteman intercontinental ballistic missile program is the task of a \$1.1 million pact won by Logicon Inc. The Air Force Space and Missile Systems Organization awarded the follow-on contract.

Computing and Software has landed a \$400,000 pact from the City of New York's Housing and Development Administration calling for the design of a computer-based system to administer the HUD's rental adjustment on more than 1 million city apartment dwellings under current rent control legislation.

The National Institutes of Health's Nursing Division has let a \$105,000 contract to Information and Communications Applications Inc. for development of a Nursing Information System. The firm has also won a contract from the General Services Administration valued at \$135,000 for the design of a minicomputer-based communication system for the Federal Supply Service.

Westinghouse Electric Corp. has been awarded a contract by the Caterpillar Tractor Co. to provide a material handling and storage system for the 25,000 sq ft warehouse under construction in East Peoria, Ill. The warehouse will be one of the largest automated facilities of its type in the world when complete.

Sequential Builds 'Better Mousetrap' But Bad Year Hurts Marketing Effort

By Mark Plomhoff
Specialist to Computerworld

Sequential Information Systems is in the ironic position of having built a better mousetrap in a number of respects but still seeing no sign that the world is beating a path to its door.

The on-line Sequential S/Com-70 model, equivalent to the Memorex 1603, prints at the rate of 15,000 lines/min compared with 10,000 lines. It sells for \$32,850, more than \$10,000 less than the 1603. The S/Com-70 functions with IBM System/370 mainframes as well as with

System/360 installations. Like the 1603 it is plug-to-plug compatible with the IBM 1403 and 1443 impact printers. It offers a basic business graphics option.

It can automatically photograph printed documents and intersperse them with the usual frames of computer printouts. For a \$7,000 surcharge, Sequential will replace its 16 mm strip recorder with a universal camera that can structure the popular file formats directly. In print quality the S/Com-70 is the same as the 1603, since it also employs a 5 by 7 character matrix.

A particular distinction of the S/Com-70 microfilm is that it alone of the on-line recorders on the market today is not limited to IBM mainframes. At a cost of \$3,000 to \$5,000, Sequential will add a minicomputer that translates output from whatever computer the customer is using into the IBM code that actuates the S/Com.

A second distinction of the S/Com is that it has both on-line and off-line capability, while the two other LED microfilmers perform on-line only. The price of the off-line model is \$35,850, including both an IBM-compatible tape transport and interface. It prints at the rate of 15,000 lines/min, but otherwise has the same characteristics as the on-line model.

The Sequential universal camera could easily replace the standard 16 mm recorder, and the purchase price would increase to \$42,850. The minicomputer converter would adapt non-IBM tape transports and interfaces to use with the S/Com. At present relatively few EDP

facilities produce as many as 500,000 report pages per month; indeed, small installations that turn out less than 100,000 pages/month are not uncommon. Yet we see that the poly rate of only 5,000 line/min would produce 750,000 pages/month assuming no allowances for job changeover or downtime.

Allowing 25% unproductive time, the volume would still come to over 500,000 pages. The on-line S/Com could generate nearly 2,500,000 page/mo in continuous first-shift operation, and around 1,800,000 pages with interruptions.

It is understood, of course, that on-line printers must respond to the peak output rates of the mainframe and do not necessarily operate all the time.

The off-line model could produce about 1,500,000 page/mo. These figures suggest that the S/Com could perform well for a service bureau that needed a backup recorder to carry out straightforward, low-cost printing and business graphics assignments.

The attractive characteristics of the S/Com notwithstanding, there is so far no recognizable sign of a market penetration. Because it seems fair to categorize this recorder as a product of merit, its predicament is as significant as Memorex's success.

The story seems to boil down to the fact that the S/Com is being marketed in isolation rather than as a component of a full-fledged micrographics system. The offer of Sequential to supply all or part of the S/Com as an OEM product has so far changed nothing. Undoubtedly, an even more fundamental cause overhangs the situation as well—the misfortune of reaching the market in a miserable year when few organizations are willing to expend funds.

Plomhoff is Associate Editor of the Auerbach Graphic Processing Reports.

HOW do you think users reacted to IBM's fixed-term lease announcement? WHAT are the prospects for the rest of the industry after IBM's price increase on CPUs etc.?

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EDP industry report

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System/7 Tests

Computers play a major role in the pre-shipment testing of the System/7 at Boca Raton, Fla. A technician testing a System/7 feature module (center foreground) uses an IBM 1130 computer and automatic system entry device (left background) to enter test information from punched cards. This system is linked to a 380/40 which stores test programs and common data used to verify module functions and diagnose failures. A direct digital test module (right background) provides a communications link between a test processor and a group of simulators (left and right foreground). The input/output tester (right foreground) generates simulated analog signals to check the computer's analog elements. The test station power system (left foreground) generates operational power to the module under test and also houses a System/7 processor unit to provide module interface simulation.

Orders & Installations

The Postal and Telecommunications Ministry of France has ordered a Postal Address Reader-Indexer System from Recognition Equipment France, S.A., a subsidiary of Recognition Equipment Inc.

The Fireman's Fund American Insurance Company has installed an IBM 340/65 valued at \$3.5 million. The system includes an IBM 3330 disk system.

Eida, an independent service bureau in Dusseldorf, Germany, has ordered a Honeywell 6030 system.

Educational Testing Services is leasing two Model ECM-45 extended core memories from Ampex Corp.

International Communications Corp., a subsidiary of Milgo Electronics Corp., has received an order for 100 modems from Eastern Airlines. The order includes 60 ICC Modem 2200/24 data sets and 40 Modem 4500/48 data sets.

The Autonomous University of Guadalajara, Mexico, has purchased and will install an NCR Century 200 in November.

Univac has reported the following 9000 series orders: a 9300-II by the Tomkins-Johnson Co.; a 9200 by Lester Industries; a

9200 by Jaffe Shoes Corp.; a 9200 by Lovelace Truck Service; a 9200-II by Woods Industries Inc.; another 9200-II by Silver Eagle Trucking Co.; a 9200 by Grange Mutual Life Co.; and a 9200 installed at Louisville Title Insurance Co.

TRW Systems Inc. has ordered a SEC-2000 aerospace computer to be used in an advanced navigation system from the Kerfoot Division of The Singer Co.

The Illinois Division of Highway has completed the installation of Comshare's software package "Hyper-Faster" to replace the IBM-installed Faster system.

Scan Data Corp. has installed its Model 250 document and page reading system at the headquarters of the Beneficial Standard Corp.

An 1108 from Univac has been installed at the U.S. Army's Edgewood Arsenal.

Data Resources Inc. has placed an order with Burroughs for a B4700 with dual central processors. The order is valued at over \$2.7 million.

PowerMate Corp. has installed a Data General Datapoint Tape preparation system to prepare tapes for the numerically controlled Di-Acro punch press.

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Nickels & Dimes

RCA declared a quarterly dividend of 25 cents per share on the company's common stock, payable Nov. 1 to holders of record Sept. 13. The firm also declared dividends of 87.5 cents per share on the \$3.50 cumulative first preferred stock and \$1 per share on the \$4 cumulative convertible series first preferred stock, both for the period from Oct. 1 to Dec. 31 and both payable Jan. 3, 1972 to holders of record Dec. 10.

\$\$\$
Reorganization claims another - Cybernetic Development Corp. has filed a petition under Chapter 11 of the Bankruptcy Act and a committee of unsecured creditors is being formed under the auspices of the New Jersey Association of Credit Executives, 17 William St., Newark, N.J.

\$\$\$
Computerized voting turnaround? Stockholders of Data-

media Computer Service Inc. were told of a profitable turnaround in the firm's business of selling punch card voting machines at the company's first annual meeting. Within a year the firm went from a \$208,000 loss to a \$4,000 profit. In addition the firm has closed a \$200,000 two-year loan and changed its name to Datamedia International.

\$\$\$
Syner-Data is "heartened by the realization" that it overcame "the same belligerent economy that stifled many of its peers," but is not pleased with the latest loss - \$1.19 per share on sales of \$1.1 million, noted John I. Becker, president. The loss comes on top of loss of \$1.18 per share the year before.

\$\$\$
New Court Securities Corp. has purchased a substantial equity position in Computer Transmission Corp. in a private placement.

Model 33ASR with dial-up set and complete maintenance service for \$74 per month.



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Crisis Seen Passing in Services Area; Profitability Predicted for This Year

CHICAGO - The "crisis in passing in the computer services industry" and as it passes "profits are up," Bernard Goldstein, president of the Association of Data Processing Services Organizations (Adapso) told the Computer Science Analysts here last week.

The industry is presently marked by a change from the entrepreneurial to the managerial stage with firms that have strong management bent able to survive, said Goldstein, also president of United Data Centers, Inc.

As to the past few years, Goldstein said when the stock market broke and firms could not get new capital "the negative cash flow became a nightmare. And with this nightmare, the industry woke up with many management looking bankruptcy in the eyes."

Overall industry profit of 2.5% in 1969 dropped to 1.7% in 1970, to minus 8.3% on sales, he noted, adding that the latest issue of the Manhattan Yellow Pages contained four fewer pages under data processing services than a year ago.

But "profit levels of 4% on gross volume are possible in calendar 1971 which, while not satisfactory, would nevertheless represent a significant 12% turnaround from the minus 8% of the prior year," Goldstein observed.

The turnaround, he said, is due to a greater emphasis on "profits, actual and real profits," on the part of the surviving management. An informal survey under the auspices of Adapso indicates "the majority of its members are now operating profitably," Goldstein said. The more responsible members of the industry will be the ones to survive, he added.

On the present state of the industry, Goldstein estimated that data centers grossed about \$1 billion in 1970; software companies reached \$540 million; facilities management firms \$150 million; and time-sharing firms around \$300 million.

The overall market, which is now around \$2.5 billion to \$3.5

billion will reach around \$5 billion to \$6 billion by 1973, he added, with time-sharing alone expected to grow to \$1.3 billion.

The fever is off the computer services field, Goldstein said, "because of an improving economy - our industry's services sell well in a down economy - but because the unqualified have had their day at bat and are now out of the hall game, unable to return since their equally unqualified financiers are no longer willing to back - any and all who wrap themselves in the mantle 'computer'."

Someday, Goldstein predicted, the computer industry will have

a special federal regulatory agency concerned with both its economic and social impact. Presently it is the "stepchild" of regulation, he said, falling under the Federal Communications Commission, Federal Reserve Board, and other agencies that regulate some aspect of the industry.

"When you consider the impact that this revolutionary device has had on our society in a short 25 years since its invention, and when you further consider its eventual importance in our arsenal for world trade, it is reasonable to forecast that it will someday have its own regulatory agency," Goldstein concluded.

Collins Holders Approve Stock Purchase by NR

CEDAR RAPIDS, Iowa - Collins Radio Co. shareholders here approved a stock purchase agreement under which North American Rockwell Corp. (NR) will make a \$35 million cash investment in Collins.

The agreement involves the cash purchase by NR of 350,000 shares of a new class of Collins \$5 cumulative convertible preferred stock, Series A - which would be convertible into 1.9 million shares of a new class of Class A common stock and warrants to purchase an additional 1.6 million shares of Class A common stock. Initial conversion or exercise price is \$15.50.

Restated articles of incorporation necessary to consummate the transaction also were adopted.

Upon completion of the agreement, the Collins board will consist of 13 members, seven designated by NR and six named by Collins. Arthur A. Collins will continue as president, principal executive officer and director, with W.F. Rockwell Jr., chair-

man and chief executive officer of NR, serving as chairman of the Collins board.

Graham Sales, Earnings Jump

GRAHAM, Texas - Graham Agnetics Inc. said it has "completed the most outstanding year in its history."

For the year ended June 30, the firm had a 55% increase in revenues and a turnaround in profitability - from a loss of \$960,432 to an income of \$986,752 (\$1.47 per share).

Graham's operating income before income taxes and extraordinary items climbed to \$894,367 in the year just completed, compared with operating losses of \$114,238 in fiscal 1970. Last year an extraordinary loss of over \$1 million resulted in the company's net loss for the year.

Total revenue for 1971 rose to \$7.7 million compared with almost \$5 million in the 1970 fiscal year.

Acquisitions

Planning Research Corp. (PRC) has acquired Greenwich Data Systems, Inc., Greenwich, Conn., which will operate as a wholly owned subsidiary. Terms were not disclosed.

PRC has reached a preliminary agreement to acquire Systems Science Development Corp., management consultants in law enforcement and information systems.

Motek Corp., Valley Forge, Pa., has completed arrangements to acquire a controlling interest in MegSystems, Inc., a time-sharing firm. Motek is a holding company with interests in computer-based management services.

Electronic Associates, Inc. has purchased Visual Edcom, Inc. for \$1.6 million. Edcom manufactures educational/communications products.

Worldwide Computer Services Inc., Hartsdale, N.Y., and Transcontinental Leasing Corp., Los Angeles, have agreed in principle to Worldwide's acquisition of Trans-Continental. Worldwide

will continue its computer software consulting services. Trans-Continental leases trucks and medical equipment.

Hittman Corp. has acquired Data Information Systems Corp. (Disc) for an undisclosed amount of stock. Disc provides systems design, analysis, consulting, and programming services.

Data-Tronics Corp. has agreed to purchase certain assets of CompuShare, Inc., Des Moines, Iowa. Terms were not disclosed. CompuShare is a service bureau principally owned by Brady Motorfranchise, Inc. and Bruce Motor Freight, Inc.

Data Rentals, Inc., Los Angeles, Calif., has acquired Databank Machines, Palo Alto, Calif. Databank leases, sells and services IBM punch card equipment. Data Rentals also deals in IBM equipment.

Syncom Inc. has agreed in principle to acquire Salsbery Inc., which manufactures ski hats. Syncom sells mag tape, accessories and services through its ShieldsData Division.

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Computerworld Stock Trading Summary

CLOSING PRICES THURSDAY, SEPTEMBER 8, 1971

All statistics
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| E S C | 1971 RANGE | CLOSE SEP 08 (1) | PRICE- 1971 | | WEEK NET CHG | WEEK HIGH CHG | E S C | 1971 RANGE | CLOSE SEP 08 (1) | PRICE- 1971 | | WEEK NET CHG | WEEK HIGH CHG |
|--------------------------|---------------|------------------------|----------------|------|--------------------|---------------------|-----------------------|---------------|------------------------|----------------|------|--------------------|---------------------|
| | | | 1971 | 1971 | | | | | | 1971 | 1971 | | |
| | | | | | | | | | | | | | |
| SOFTWARE & DEV SERVICES | | | | | | | | | | | | | |
| O ADVANCED COMP TECH | 1-4 | 1 1/4 | 0 | 0.0 | | | N MEMBERS | 27-78 | 58 1/4 | + 1/4 | +0.8 | | |
| A APPLIED DATA RES. | 1-13 | 2 3/4 | + 1/4 | +0.4 | | | N IN COMPANY | 26-47 | 45 1/2 | + 1/2 | +0.8 | | |
| O APPLIED LOGIC | 1-3 | 5/8 | 0 | 0.0 | | | O MORSE BUS. FORMS | 16-42 | 40 1/4 | + 1/2 | +0.2 | | |
| O ARTES | 1-11 | 1 1/2 | + 1/2 | +0.4 | | | N NADSA CORP | 26-47 | 45 1/2 | + 1/2 | +0.8 | | |
| N AUTOMATIC DATA PROC | 4A-45 | 81 3/2 | + 5/8 | +0.2 | | | O RETOULDS & RETOULD | 37-62 | 57 | + 1/2 | +0.8 | | |
| O AUTO SCIENCES | 3-8 | 3 5/8 | 0 | 0.0 | | | A STANDARD & SISTER | 14-23 | 16 3/8 | + 1/4 | +0.2 | | |
| O BOUTHE DATA SYS | 1-2 | 7/8 | 0 | 0.0 | | | N UNICO | 25-34 | 25 5/8 | + 1/2 | +1.0 | | |
| O BRANSON APPLIED SYS | 1-1 | 3/8 | 0 | 0.0 | | | A VARASH MAGNETICS | 16-10 | 6 3/4 | + 1/8 | +1.0 | | |
| O COMPUTER ENVIRON | 1-2 | 1 1/2 | - 1/4 | -0.3 | | | N WALLACE JOE FORMS | 14-28 | 21 1/4 | + 1/4 | +0.3 | | |
| O COMPUTER NETWORK | 11-14 | 4 1/2 | 0 | 0.0 | | | COMPUTER SYSTEMS | | | | | | |
| O COMPUTER PROPERTY | 5-11 | 5 | 0 | 0.0 | | | N BURROUGHS CORP | 105-140 | 132 5/8 | + 1/2 | +1.1 | | |
| O COMPUTER SCIENCES | 6-17 | 6 | 0 | 0.0 | | | N COLLINS RADIO | 12-20 | 15 | + 1/2 | +0.2 | | |
| O COMPUTER TASK GROUP | 1-3 | 1 1/2 | 0 | 0.0 | | | N NEC | 57-69 | 63 3/4 | + 7/8 | +0.2 | | |
| O COMPUTER USAGE | 5-16 | 7 3/4 | + 1/2 | +0.8 | | | N NETSCOUT | 28-40 | 36 1/2 | + 1/4 | +0.4 | | |
| O COMP AUTOMOT REPORTS | 6-13 | 6 1/2 | - 1/2 | -0.5 | | | O SCI. CONTROL CORP. | 1-2 | 5/8 | 0 | 0.0 | | |
| O COMPUTING & SOFTWARE | 24-35 | 27 1/2 | + 1/2 | +0.8 | | | N SPERRY RAND | 25-38 | 31 3/4 | + 1/2 | +0.2 | | |
| O COMTESS | 2-6 | 2 1/8 | + 1/8 | +0.2 | | | A SYSTEMS ENG. LABS | 13-18 | 14 | + 7/8 | +0.5 | | |
| O COMSHARE | 8-9 | 3 3/8 | 0 | 0.0 | | | N VARIAN ASSOCIATES | 13-18 | 14 | + 7/8 | +0.5 | | |
| O CONSOL. ANAL. CENT. | 1-2 | 2 3/8 | - 1/8 | -0.5 | | | O VICTOR COMPUTOMETER | 14-27 | 16 3/4 | + 1/4 | +0.3 | | |
| O DATA AUTOMATION | 1-4 | 1 3/8 | + 1/8 | +0.5 | | | A WARD LABS | 20-30 | 27 7/8 | + 1/4 | +0.4 | | |
| O DATA PACKAGING | 1-10 | 8 | + 1/2 | +1.0 | | | N XEROX CORP | 85-121 | 113 3/4 | + 1/2 | +0.1 | | |
| O DATAMATION SERVICE | 1-3 | 7/8 | + 1/8 | +0.6 | | | LEASING COMPANIES | | | | | | |
| L DATATAC | 4-10 | 7 3/4 | 0 | 0.0 | | | A BOSTON COMPUTER | 15-27 | 28 3/4 | + 1/4 | +0.8 | | |
| L DATABEX | 1-2 | 3/8 | 0 | 0.0 | | | A BREKIDAN CORP. | 3-4 | 5 3/8 | 0 | 0.0 | | |
| O DOP RESOURCES | 7-16 | 6 | + 1/4 | +0.1 | | | O COMPUTER EXCHANGE | 3-6 | 7/8 | - 1/8 | -0.1 | | |
| A ELECT COM DATA PROS. | 53-55 | 53 1/8 | 0 | 0.0 | | | A DATA GENERAL | 10-16 | 16 1/4 | + 1/2 | +0.3 | | |
| O ELECTRONIC DATA SYS. | 1-15 | 1 1/4 | - 1/4 | -0.5 | | | N DATA PROC. F & C | 11-16 | 16 3/4 | + 1/2 | +0.3 | | |
| O ELECTRONICS | 7-15 | 9 3/8 | 0 | 0.0 | | | O DYNAMIC RENTAL | 1-4 | 1 1/4 | + 1/4 | +0.8 | | |
| O ENEAS ASSOCIATES | 5-14 | 3 | 0 | 0.0 | | | A DCL INC | 5-13 | 8 7/8 | + 3/8 | +0.8 | | |
| O KETATA CORP | 8-16 | 8 | + 5/8 | +0.4 | | | A DEARBORN-STORM | 24-44 | 41 3/8 | + 1/4 | +0.4 | | |
| A MANAGEMENT DATA | 7-11 | 7 1/2 | 0 | 0.0 | | | A DPA, INC. | 1-13 | 8 7/8 | + 7/8 | +0.8 | | |
| O NATIONAL CES INC. | 1-4 | 9 | + 1/8 | +0.4 | | | A GRAMMEL INT | 1-13 | 3 3/4 | + 3/4 | +1.7 | | |
| O NAT COMP ANALYSTS | 1-4 | 2 | + 1/4 | +0.2 | | | A GRETHOING COMPUTER | 7-11 | 1 1/2 | + 3/8 | +0.8 | | |
| O NAT. COMP. SERV. | 1-2 | 7/8 | 0 | 0.0 | | | O ELECTRO INT INC | 2-5 | 3 7/8 | + 1/8 | +1.3 | | |
| N PLANNING RESEARCH | 16-18 | 17 | - 1/2 | -1.0 | | | A LASCOR CORP | 14-28 | 24 1/4 | + 1/4 | +0.8 | | |
| O PROGRAMMING METHODS | 14-18 | 20 1/2 | 0 | 0.0 | | | O ELECTRONIC INT CORP | 1-1 | 1 1/8 | + 1/8 | +0.3 | | |
| O PROGRAMMING & SYS | 1-3 | 1 1/2 | - 1/8 | -0.5 | | | A LMC DATA, INC. | 1-1 | 1 1/8 | + 1/8 | +0.3 | | |
| L PROGRAMMING SCIENCES | 1-3 | 1 1/2 | - 1/8 | -0.5 | | | A MCC INDUSTRIES | 5-6 | 4 1/2 | + 3/8 | +0.8 | | |
| O SCIENTIFIC COMPUTERS | 2-3 | 2 5/8 | - 1/8 | -0.4 | | | A ROCKWOOD COMPUTER | 5-6 | 4 1/2 | 0 | 0.0 | | |
| O SCIENTIFIC SOURCES | 1-2 | 3/8 | 0 | 0.0 | | | O STODDS CAPITAL | 14-27 | 37 | + 2 | +1.7 | | |
| O SOFTWARE SYSTEMS | 1-3 | 2 | + 1/4 | +1.1 | | | | | | | | | |
| O TBS COMPUTER CENTERS | 4-8 | 8 | 0 | 0.0 | | | | | | | | | |
| O TOLLET INTL. CORP. | 2-7 | 3 1/2 | - 1/8 | -0.4 | | | | | | | | | |
| N UNITED DATA CENTER | 2-7 | 3 1/2 | - 1/8 | -0.4 | | | | | | | | | |
| N UNIVERSITY COMPUTING | 21-58 | 27 3/4 | + 1/4 | +0.4 | | | | | | | | | |
| U.S. TIME SHARING | 6-11 | 6 3/4 | + 1/8 | +1.0 | | | | | | | | | |
| O U.S. SYSTEMS | 1-3 | 7/8 | 0 | 0.0 | | | | | | | | | |
| O VORTEX CORP | 2-5 | 4 3/4 | + 3/4 | +1.7 | | | | | | | | | |
| PERIPHERALS & SUBSYSTEMS | | | | | | | | | | | | | |
| N ADDRESSOGRAPH-HULT | 24-48 | 37 1/4 | - 3/4 | -1.6 | | | | | | | | | |
| O ALPHAMERIC | 3-8 | 3 1/8 | - 1/4 | -0.5 | | | | | | | | | |
| N AMPER CORP | 14-25 | 16 3/4 | + 1/4 | +1.3 | | | | | | | | | |
| O ARISTOTEL | 1-3 | 1 1/2 | 0 | 0.0 | | | | | | | | | |
| O ATLANTIC TECHNOLOGY | 3-8 | 3 3/4 | + 3/8 | +0.8 | | | | | | | | | |
| A BOLT-BERKNER & NEW | 5-8 | 5 3/4 | + 1/4 | +0.5 | | | | | | | | | |
| N BURKE-RAND | 10-17 | 10 3/4 | + 1/4 | +0.3 | | | | | | | | | |
| O CALCOMP | 10-17 | 20 7/8 | + 1 1/2 | +7.7 | | | | | | | | | |
| O COMINTONICS | 3-8 | 8 | + 5/8 | +7.2 | | | | | | | | | |
| O COLORADO INSTRUMENTS | 8-10 | 8 7/8 | 0 | 0.0 | | | | | | | | | |
| O COMPUTER COMMUN. | 6-10 | 7 1/8 | + 1/4 | +0.6 | | | | | | | | | |
| A COMPUTER EQUIPMENT | 7-9 | 7 3/8 | - 1/8 | -0.1 | | | | | | | | | |
| A COMPUTEST | 8-20 | 6 3/8 | + 3/8 | +0.2 | | | | | | | | | |
| O CONSOL COMPUTER LTO. | 4-12 | 2 1/2 | - 1/2 | -3.5 | | | | | | | | | |
| O DATA PRODUCTS CORP. | 5-10 | 8 1/8 | + 7/8 | +6.8 | | | | | | | | | |
| O DATA TECHNOLOG | 7-9 | 12 1/2 | + 1/2 | +7.7 | | | | | | | | | |
| O ELECTRONICS | 4-8 | 4 1/2 | 0 | 0.0 | | | | | | | | | |
| N ELECTRONIC M & H | 4-6 | 6 7/8 | + 7/8 | +6.0 | | | | | | | | | |
| O FARMI-TEX | 2-4 | 2 3/4 | + 1/8 | +0.7 | | | | | | | | | |
| O FARRINGTON INFO | 1-3 | 1 3/8 | 0 | 0.0 | | | | | | | | | |
| O FOTO-HOT INC | 1-3 | 3/8 | 0 | 0.0 | | | | | | | | | |
| O INFOR B. INC | 25-46 | 27 1/4 | - 1/4 | -0.8 | | | | | | | | | |
| O INFORMATION DISPLAYS | 1-2 | 5 3/4 | + 3/4 | +2.5 | | | | | | | | | |
| O MANAGEMENT ASSIST | 1-2 | 4 | 0 | 0.0 | | | | | | | | | |
| A MARSHALL INDUSTRIES | 14-27 | 14 1/4 | + 3/4 | +5.0 | | | | | | | | | |
| A MILD ELECTRONICS | 13-16 | 16 5/8 | + 3/8 | +2.6 | | | | | | | | | |
| N MINICOM DATA SCI | 22-27 | 27 3/8 | + 1/4 | +2.7 | | | | | | | | | |
| O ON LINE SYSTEMS INC | 7-12 | 10 1/4 | - 1/4 | -1.2 | | | | | | | | | |
| O OPTICAL SCANNING | 10-18 | 11 1/4 | - 1/2 | -2.2 | | | | | | | | | |
| O PHOTON | 7-12 | 8 3/8 | + 3/4 | +0.8 | | | | | | | | | |
| O PHOTO-MAGNETIC SYS. | 1-8 | 3 3/4 | - 1/4 | -1.5 | | | | | | | | | |
| A POTTER INSTRUMENT | 15-25 | 15 5/8 | -1 | -5.7 | | | | | | | | | |
| O PRECISION INST. | 7-12 | 12 1/2 | + 1/2 | +5.0 | | | | | | | | | |
| O RECONSTRUCT EQUIP | 12-28 | 17 5/8 | + 5/8 | +5.7 | | | | | | | | | |
| O RECORD CORP. | 4-8 | 8 3/4 | 0 | 0.0 | | | | | | | | | |
| N RANERS ASSOCIATES | 11-22 | 12 3/4 | + 3/8 | +3.0 | | | | | | | | | |
| O SCAN DATA | 8-15 | 13 1/8 | + 1/2 | +0.8 | | | | | | | | | |
| O SALLY CORP. | 8-18 | 18 1/2 | + 1/2 | +4.0 | | | | | | | | | |
| N TELER | 13-22 | 13 7/8 | + 1/8 | +0.8 | | | | | | | | | |
| O VIATRON | 1-4 | 1 1/4 | 0 | 0.0 | | | | | | | | | |

SUPPLIES & ACCESSORIES

| | | | | | | | | | | | | | |
|-----------------------|-------|--------|-------|-------|--|--|--|--|--|--|--|--|--|
| N ADAMS-WILLIS CORP | 12-16 | 13 3/4 | +1 | +7.8 | | | | | | | | | |
| O BALTIMORE BUS FORMS | 1-10 | 7 5/8 | 0 | 0.0 | | | | | | | | | |
| A BARRY MIGHT | 8-13 | 9 1/2 | + 1/4 | +0.1 | | | | | | | | | |
| O BATA DOCUMENTS | 16-18 | 17 3/4 | + 1/2 | +1.1 | | | | | | | | | |
| O DUPLEX PRODUCTS INC | 8-15 | 8 | + 1/2 | +0.1 | | | | | | | | | |
| N ENNIS BUS. FORMS | 8-15 | 8 | + 1/2 | +0.1 | | | | | | | | | |
| O GRAMM MAGNETICS | 8-15 | 20 1/2 | - 1/2 | -10.8 | | | | | | | | | |
| O GRAPHIC CONTROLS | 8-15 | 12 3/8 | + 1/4 | +4.7 | | | | | | | | | |

Earnings Reports

GRAPHIC CONTROLS

Three Months Ended June 30

1971 1970

Rev \$115,000 \$115,000

Earnings \$3,807,803 \$3,517,499

Spec Cred \$49,351 \$49,351

Earnings \$129,378 \$129,378

\$ Mo Str .32 .29

\$ Revenue 10,468,556 11,503,583

Spec Cred \$49,351 \$49,351

Earnings \$252,092 \$305,816

c-From continuing operations.

d-Subject to 8-cents a share in the

quarter and 37 cents a share in the

six months. c-Based on income be-

fore extraordinary gain. e-From sale

of property. f-Non-recurring expenses

associated with a terminated merger in this

period.

CUBIC

Three Months Ended June 30

1971 1970

Rev \$821 \$821

Revenue 10,817,200 10,017,500

Earnings 480,500 856,000

\$ Mo Str .41 .46

Revenue 19,420,800 19,572,400

Earnings 903,700 1,009,400

PHOTON

Six Months Ended June 30

1971 1970

Rev \$1,294,280 \$1,294,280

Revenue 10,817,200 10,017,500

Earnings 480,500 856,000

Products on a pooling-of-interest

basis, and to reflect a change in

accounting practice.

Above figures exclude income from

1970 start-up settlement with

Etrix Corp. and income from 1971

settlement with Compugraphic Corp.

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